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Scientific Results of the Second Oceanographic Expedition of the "Pawnee" 1926.

HETEROSOMATA TO PEDICULATI FROM PANAMA TO LOWER CALIFORNIA.

BY C. M. BREDER, JR.

New York Aquarium and Bingham Oceanographic Foundation.

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SCIENTIFIC RESULTS OF THE SECOND OCEANOGRAPHIC EXPEDITION OF THE "PAWNEE" 1926.

HETEROSOMATA TO PEDICULATI FROM PANAMA TO LOWER CALIFORNIA.

By C. M. Breder, Jr.
New York Aquarium.

INTRODUCTION.

The introductions to the first and second parts of this report (Breder 1928a and 1928b) cover most of such remarks necessary for the present article. The treatment is uniform with the series, the deep water forms being omitted as before. The classification of Jordan, Evermann and Clark 1930 has been followed so far as convenient and in consideration of the fact that the two earlier parts of this series were published before it appeared.

Mr. Will Simmons rendered the drawings for the present paper, except Figures 2, 3 and 4, which were made by Mr. W. S. Bronson, Figures 6 and 8 by Mr. Y. H. Olsen and Figure 7 by Mr. D. Pitcher. The colored plates painted by Mr. Bronson, based on the collection of this expedition, are listed in full including those showing fishes of the previously treated orders. They are as follows.

34. *Cestracion tudes, Epinephelus analogus, Trachinotus rhodopus.*
35. *Opsanus tau, Trachurops crumenophthalmus.* (Atlantic)
36. *Angelichthys passer, Citula dorsalis* and sea snakes.
37. *Diplectrum pacificum, Halichœres semicinctus.*
38. *Trachinotus rhodopus.*
39. *Cirrhites rivulatus, Myrichthys tigrinus* and invertebrates.
40. *Rhinobatus leucorhynchus, Halichœres sellifer.*
41. *Angelichthys passer, Pimelometopon darwinii.*
42. *Pimelometopon pulcher, Paralabrax maculatofasciatus.*
43. *Upeneus grandisquamis, Porichthys margaritatus.*

There are also five others representing deep water forms (44 to 48 inclusive).

In the present contribution there are described one new genus, seven new species, and one new subspecies. They are as follows.

Hypsopsetta macrocephala.
Hubbsiella.
Apogon parri.
Alphestes immaculatus.
Paraconodon orthopristis.
Anisotremus mowbrayi.
Ophidion nigracauda.
Ophidion iris.
Canthigaster punctatissimus reticulatus.

Ulrey 1929 gives an excellent check list of Southern and Lower California, the range of which the present list overlaps. See also Ulrey and Greeley 1924 and 1928.

ANNOTATED SYSTEMATIC LIST OF SPECIES.

Order HETEROSOMATA.

Family **PLEURONECTIDÆ.**

1. **Platophrys leopardinus** (Günther).

647 (7) Lat. 14.18.40 N. Long. 92.54.40 W. April 9. 30 faths. No. 5 trawl. Common on shell bottom. Dorsal and anal edged with red and white.
651 (1) Salina Bay, Carmen Island. April 29. Seine.
657 (4) San Jose Island. April 24.
661 (1) Pedro Gonzales Island, Perlas Islands. April 2.
667 (1) Perlas Islands. March 31. Seine.
673 (2) Danzante Island. April 27. Seine.

2. **Syacium ovale** (Günther).

789 (1) San Francisquito, Gonzago Bay, San Filepe.
656 (4) Long. 95.54.40 W. Lat. 14.48.40 N. April 9. 30 faths. No. 5 trawl. Common.
662 (1) Pedro Gonzales Island. Perlas Islands. April 2.
665 (6) May 18. Trawl. 17 faths.
668 (2) Perlas Islands. March 31. Seine.
640 (1) ——.
653 (3) Conception Bay. May 3.

644 (51) Long. 92.40.30 W. Lat. 14.40.20 N. April 9. 288 flounders. Length 30 to 126 mm. 19 faths.
654 (72) Part of 644.
655 (92) Part of 644.

3. **Citharichthys gilberti** Jenkins & Evermann.

808 (1) San Francisquito Bay. May 7. Seine.

4. **Etropus crossotus** Jordan & Gilbert.

638 (2) ——.
642 (5) Gonzago Bay. May 17. Seine.
648 (9) Conception Bay. May 1. Seine.
650 (38) Salina Bay, Carmen Island. April 29. Seine.
652 (19) Conception Bay. May 3.
660 (3) Gonzago Bay. May 18. Trawl.
666 (1) Perlas Islands. March 31. Seine.
672 (2) Puerto Refugio Bay.
676 (1) Angelus Bay. May 11. Seine.
There is also the following larval material.
678 (26) Lat. 14.40.20 N. Long. 92.40.30 W. April 9. 19 faths.
679 (1) Off Tartar Shoal, Mexico. June 1. In trawl at night. 330 faths.
680 (4) Off Cape Corrientes, Mexico. May 29. Trawl at night in 200 faths.
1215 (1) Carmen Island, Ballenas Bay. April 30.

5. **Azevia panamensis** Steindachner.

1216 (1) Perlas Islands 19–24 faths. Lat. 2.29.40 N. Long. 78.52.30 W. March 31.

6. **Lioglossina tetropthalma** Gilbert.

806 (1) San Francisquito Bay. May 7. No. 7.

7. **Xystreurys liolepis** Jordan & Gilbert.

807 (1) San Francisquito Bay. May 7. No. 7.

8. **Paralichthys æstuarius** Gilbert & Scofield.

790 (1) San Francisquito, Gonzago Bay, San Filepe.
805 (2) San Francisquito Bay. May 7. No. 7.
643 (10) Gonzago Bay. May 17. Seine.
645 (1) San Francisquito Bay. May 9. Seine.
649 (1) Conception Bay. May 1. Seine.
658 (3) San Filepe Bay. May 19. Seine.

659 (9) Gonzago Bay. May 18. Trawl.
669 (2) San Francisquito Bay. May 9. Seine.
671 (1) Conception Bay. May 2.
675 (1) Angelus Bay. May 11. Seine.
681 (3) San Filepe Bay. May 19. Seine.
906 (1) ——.

9. **Paralichthys woolmani** Jordan & Williams.

639 (1) ——.
670 (1) Perlas Islands. March 31. Seine.

10. **Pleuronichthys ocellatus** Starks & Thompson.

637 (4) ——.
641 (8) Gonzago Bay. May 17. Seine.
663 (2) Conception Bay. May 3.

11. **Hypsopsetta guttulata** (Girard).

The highest fin count is of a specimen 78 mm. s. l. which follows: dorsal 71, anal 53. These are higher than the description calls for and it may be that this species and the form here called *macrocephala* represent extremes of variation. However it seems best at this time, on the basis of the present material, not to try to force them under a single, specific head.

664 (1) San Francisquito Bay. May 11. Seine.
677 (1) Angelus Bay. May 11. Seine.

12. **Hypsopsetta macrocephala** new species.

Type No. 809 Bingham Oceanographic Collection. Figure 1. Standard length 230 mm., total length 275 mm.

Head 4.0; depth 1.7; dorsal 78; anal 57; lateral line (tubes) 77 (approximate), transverse series of scales 86 (approximate); body very deep, eyes and color on right side, high and somewhat angulated near middle of back and belly; eyes moderate, 5.9; high and prominent, separated by a flat interorbital space, about 0.75 in pupil; head without spines or tubercles; scales of opercular region little developed; those of blind side reduced, accessory lateral line long, 2.1 in body, ending under 35th dorsal ray; mouth small, the maxillary reaching to anterior margin of eye, 4.4; snout equal to 0.75 of maxillary; lips thick but not plicate; teeth small, conical and numerous on blind side, none in upper jaw of eyed side, about three in lower; pectoral of eyed side 1.9 in head, of blind side 2.4; ventrals subequal, not reaching anal, 3.0 in head; caudal peduncle about twice as deep as long, its depth 1.7 in head; caudal large, 1.2 in head, evenly rounded, gill-rakers short and broad, 9 below angle of first arch; scales very irregularly placed, becoming larger posteriorly, cycloid and adherent; rays of vertical fins with small

scales on basal half; dorsal origin on median line, over front of upper eye; anal origin below angle of pectoral insertion.

Coloration—Above dark, slaty brown, the caudal scarcely lighter, dorsal and anal lighter brown with some irregular dark markings, entirely light below.

Named *macrocephala* in allusion to the large head.

This species is close to *H. guttulata* (Girard) but differs clearly in the higher fin counts and a number of minor measurements, but is similar in all the important generic characters.

809 (1) San Francisquito Bay. May 7. No. 7.

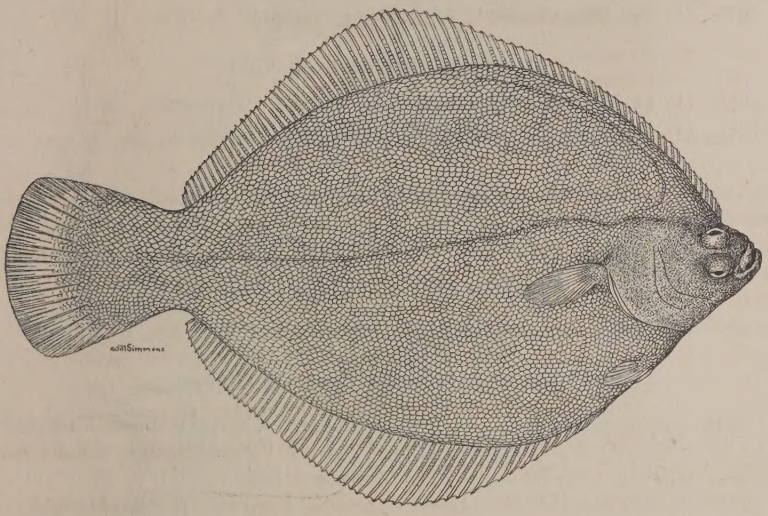

Fig. 1. *Hypsosetta macrocephala* new species. Type.

Family **SOLEIDÆ**.

13. **Symphurus fasciolaris** Gilbert.

636 (2) Carmen Island, Salina Bay. April 29. Seine.
674 (1) Danzante Island. April 27. Seine.

14. **Symphurus elongatus** (Günther).

630 (9) North of San Filepe. May 20. 14 faths.
631 (1) San Filepe Bay. May 19. 3 faths. Boat trawl.
632 (2) ——.
635 (1) Carmen Island, Salina Bay. April 29. Seine.

15. **Symphurus atricaudus** (Jordan and Gilbert).

633 (2) ——.
634 (14) Gonzago Bay. May 17. Seine.

Order BERYCOIDEI.

Family **HOLOCENTRIDÆ.**

16. **Myripristis occidentalis** Gill.

1072 (1) St. Elmo Bay, Perlas Islands. April 1. Dynamite. 20 ft.
1073 (1) San Diego Rocks. April 25. Dynamite. 4 faths.

17. **Adioryx suborbitalis** (Gill).

1071 (1) St. Elmo Bay, Perlas Islands. April 1. Dynamite. 20 ft.
1211 (1) Pedro Gonzales Island, Perlas Islands. April 2.

Order PERCOMORPHI.

Family **ATHERINIDÆ.**

18. **Hubbesia gilberti** (Jordan & Bollman).

682 (7) Perlas Islands, Rey Island. March 31. Seine No. 1. Perlas.

19. **Eurystole eriarcha** (Jordan & Gilbert).

In the present material and the type figure the first dorsal is midway between the tip of the snout and the caudal base and not "slightly nearer snout than base of tail" as given by Jordan and Evermann 1896.

1225 (5) San Jose del Cabo, Lower California, April 14. Surface at night.

GENUS **Hubbsiella** new genus.

TYPE—*Menidia clara* Evermann & Jenkins.

Menidia clara Evermann & Jenkins, Proc. U. S. Nat. Mus., 14, 136, 1891.

This genus differs from *Menidia* in the smaller scales 54 to 56, which are not all entire, many being very irregularly laciniate. Its relationship with *Leuresthes*, suggested by Jordan & Evermann 1896 and Jordan and Hubbs 1919, is more adequately borne out by the present material. This is especially suggested by the exceedingly protractile premaxillaries, Figure 2, the short, weak and very oblique lower jaw, the slender but well rounded body, the shortness of the pectorals, the insertion of the first dorsal and the character of the sculpturing of the scales, Figure 3. It also approaches *Hubbesia gilberti* in the character of the

mouth, the broad head and the lack of scaly fin sheaths and by having apical tubercles on the scales instead of ridges. *Membras* is suggested by some of the scales being irregularly laciniate.

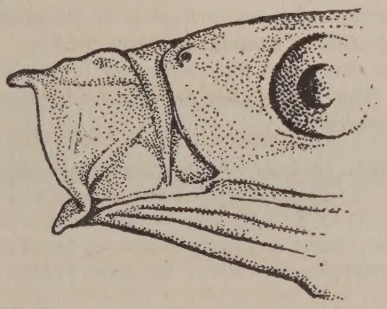

Fig. 2. The protracted premaxillaries of *Hubbsiella clara* (Evermann and Jenkins).

Dr. Carl L. Hubbs examined some of this material and wrote as follows concerning his opinion of its relationships in a personal communication. "*Menidia clara* was probably derived from a form like *Hubbesia gilberti* and itself is

Fig. 3. A single scale of *Hubbsiella clara* (Evermann and Jenkins). From No. 1168.

probably near the ancestral type from which the grunion (*Leuresthes tenuis*) was derived. Its resemblances to the genera of South America are presumably due to convergent evolution."

Jordan & Hubbs 1919 suggest that "It should perhaps be made the type of a distinct subgenus or genus," but with only the type description, the type specimen having been destroyed, were unable to erect a proper genus for it. As Hubbs has been so active in the work of providing better delimitations to these groups, and of personal assistance in regards to the atherinids of the present collection, I take pleasure in naming the genus for him. The redescription of the single species of this genus may suffice for further details concerning its characterization. The two genera under consideration may be separated according to the following key.

A. Scales large, 36 to 46; body not especially slender, usually less than 6; scale margins entire; no specialized scales above anal; fins scaleless.... *Menidia.*

AA. Scales smaller, 54 to 56; body very slender, depth 6 or over (except in very young examples); scales irregularly laciniate; a row of specialized scales above anal in large examples; anal with a few scales at base..... *Hubbsiella.*

20. **Hubbsiella clara** (Evermann & Jenkins).

Description of the largest specimen. Standard length 167 mm., total length 198 mm. See Figure 4.

Head 4.6; depth 6.7; dorsal VI–I, 9½; anal I, 22½; scales 54. Body very elongate, not especially compressed; belly evenly rounded; head a little deeper than wide; interorbital space slightly but evenly convex, 3.7; eye small, 6.0; lower jaw included; snout long, pointed, 3.0; mouth rather small, oblique; maxillary reaching about half way to eye, 4.0; premaxillaries excessively protractile and greatly dilated behind, with a curving lateral edge; teeth small, but evident, in two rows in each jaw, those in the upper the largest; gill-rakers slender, scarcely as long as eye, 30 on lower limb of first arch; scales with apical tubercles, the edges irregularly laciniate but with many smooth edged, 10 transverse rows between first dorsal and anal; dorsal and anal scaleless except at the latter's base; spinous dorsal inserted in advance of anal, midway between edge of opercle and caudal base; anal inserted under next to last spine of first dorsal, its base long, equal to head, inserted midway between inner angle of pectoral base and base of caudal; soft dorsal inserted about over middle of anal, about midway between ventral tips and base of caudal; no scaly fin sheaths but a row of specialized, firm, raised, jagged scales along anal base about 12 in number; pectoral fins short, 1.4 in head, failing to reach ventrals by a distance a little greater than snout; ventrals small, 2.3 in head, reaching about half way to vent, inserted midway between posterior margin or eye and origin of second dorsal; lower caudal lobe a little longer than upper.

Coloration—Light tan above with each scale outlined with darker, giving the appearance of a criss-cross of dark lines; a dark lateral band widest under soft dorsal, equal to eye, narrowest on peduncle, a little greater than pupil posterior to which it expands again and turns upward slightly; light below this band; a

dusky, diagonal streak on opercle running from upper angle of gill cleft diagonally forward and down, about one-third wider than eye; tip of jaw, maxillaries and mandibular symphysis dark; also a dark, nearly black spot at angle of gape, which disappears under premaxillary on closing mouth; a dusky median line on back; fins all plain.

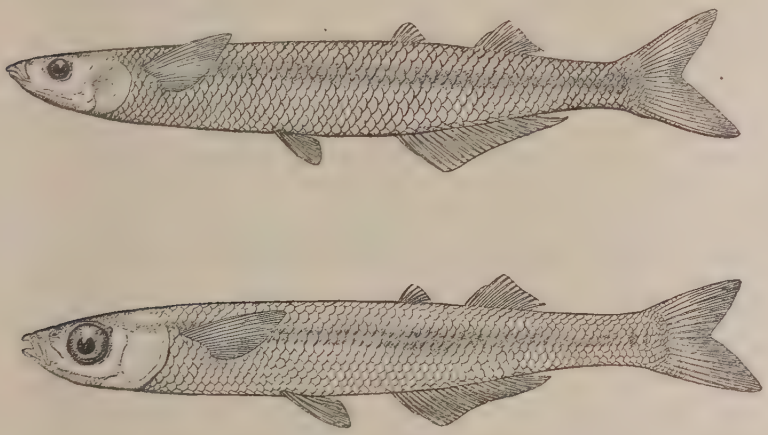

Fig. 4. *Hubbsiella clara* (Evermann and Jenkins). Upper: 167 mm. in standard length. Lower: 42 mm. in standard length.

For purposes of comparison the measurements of several sized individuals are given in Table I. The others are intermediate. There is much individual variation however, so certain of the more variable measurements were selected and Table II gives these for the entire collection of this species arranged according to size.

TABLE I.—Proportions of *Hubbsiella clara*.

Measurement	Type					
s. l. mm.	167	146	126	76	54	42
Head	4.6	5.0	5.0	4.2	4.2	4.4
Depth	6.7	7.0	6.6	6.3	6.6	6.5
Interorbital	3.7	3.7	4.2	3.0	3.2	3.0
Eye	6.0	6.0	4.3	3.0	4.3	3.5
Snout	3.0	2.9	3.1	—	3.0	3.0
Maxillary	4.0	3.4	3.5	—	3.0	3.0
Pectoral	1.4	1.3	1.2	1.5	1.2	1.2
Ventral	2.3	2.2	1.8	—	2.3	2.1

TABLE II.—Range of Proportions in *Hubbsiella clara.*

s. l. mm.	Pectoral	Ventral	Head	Depth
42	1.2	2.1	4.4	6.5
45	1.1	2.3	4.2	5.5
48	1.1	2.1	4.2	6.3
50	1.1	2.0	4.6	5.7
50	1.1	2.0	4.3	6.0
50	1.2	2.3	4.4	6.1
54	1.2	2.3	4.2	6.6
57	1.2	2.1	4.4	6.2
58	1.2	2.2	4.3	6.1
126	1.2	1.8	5.0	6.6
127	1.1	1.8	5.3	7.7
131	1.2	1.8	5.0	7.4
133	1.2	1.9	5.0	7.9
138	1.2	1.9	5.0	7.2
140	1.2	1.8	5.6	7.0
146	1.2	1.9	5.2	7.2
147	1.2	2.0	5.2	7.3
148	1.2	1.8	5.0	7.1
162	1.3	2.1	5.1	6.8
167	1.4	2.3	4.6	6.7

1226 (15) San Filepe Bay. May 19. Seine.—
765 (5) San Francisco Bay. Mexico. May 7. Seine.—

21. **Mugilops cyanella** Meek & Hildebrand.

937 (1) Perlas Islands. March 31. Lat. 8.29.40 N. Long. 78.52.30 W. 19–24 faths.

22. **Colpichthys regis** (Jenkins & Evermann).

749 (9) Georges Bay, Senora, Mexico. May 23. Seine.

23. **Atherinops insularum cedroscensis** Hubbs.

750 (15) San Francisquito Bay. May 8. Surface at night.
751 (4) Puerto Refugio, Angel de la Guardia. May 15.
752 (10) Conception Bay. May 1.
766 (6) Conception Bay. May 1. Seine.
768 (56) San Francisco Bay. May 9. Seine.
769 (6) Conception Bay. May 3.
770 (8) Puerto Refugio, Angel de la Guardia. May 15.
771 (1) San Francisquito Bay. May 7. Surface.
772 (2) Angelus Bay. May 12. Surface at night.
773 (1) Gonzago Bay. May 17. Seine.

Family **MUGILIDÆ.**

24. **Mugil cephalus** Linnæus.

1227 (1) San Filepe Bay. May 19. Seine.
1194 (1) San Francisquito, Gonzago Bay. San Filepe.

25. **Mugil curema** Cuvier & Valenciennes.

1228 (1) Georges Bay, Senora, Mexico. May 23. Seine.
734 (3) Perlas Islands, Rey Island. March 30. Surface at night.
725 (15) Perlas Islands, Rey Island. March 31. Seine
1229 (2) ——.
1197 (1) Perlas Islands. April 2–3.
712 (4) ——.

26. **Chænomugil proboscideus** (Günther).

1181 (1) St. Elmo Bay, Perlas Islands. April 1. Shore Coll.
711 (1) ——.
727 (31) Georges Bay, Senora, May 23. Seine.

Family **SPHYRÆNIDÆ.**

27. **Sphyræna argentea** Girard.

709 (2) ——.
820 (1) ——.

28. **Sphyræna ensis** Jordan & Gilbert.

701 (1) Bahia Honda, Panama. April 5–6.
710 (1) ——.

Family **POLYNEMIDÆ.**

29. **Polynemus approximans** Lay & Bennett.

1105 (4) Perlas Islands, Panama. March 30. Surface at night.
713 (4) ——.
731 (2) April 9. Trawl. 19 faths.

30. **Polydactylus opercularis** (Gill).

714 (2) ——.

Family **SCOMBRIDÆ.**

31. **Scomberomorus sierra** Jordan & Starks.

830 (1) ——.

32. **Scomberomorus concolor** (Lockington).

This little known form is readily distinguished by its numerous gill-rakers. As the other records are from Monterey Bay and Panama Bay only, it may be that the one from the Gulf of California represents a Gulf race.

The significant measurements follow.

Standard length	491	520
Head	4.7	4.2
Depth	5.6	5.3
Maxillary (to a pupil behind eye)	1.8	1.8
Eye	6.4	7.0
Snout	2.8	2.8
Gill-rakers (0.9 in eye)	17	17
Pectoral	1.5	1.7
Ventral	3.9	3.9

Attention is called to the rather larger head, more slender body, the relatively longer maxillary (to beyond posterior margin of eye) and the smaller eye.

774 (1) San Francisquito, Gonzago Bay, San Filepe.
894 (1) ——.

33. **Pneumatophorus diego** (Ayres).

890 (1) ——.
982 (21) Balleanas Bay, Carmen Island. April 30.
983 (17) Puerto Refugio. May 14. Dip net at night.
984 (1) Gonzago Bay. May 17. Seine.
985 (2) Cape San Lucas Bay. April 17. Surface at night.
986 (2) San Francisquito Bay. May 8. Surface at night.
987 (2) San Jose del Cabo. April 14. Surface at night.
988 (1) Cape San Lucas. April 15. At night with light.

There is also a bottle of post larvae with the following data.

595 (40 approx.) San Filepe Bay. May 18. Surface with dip net at night. 21 to 58 mm.

34. **Euthynnus alletteratus** (Rafinesque).

827 (2) ——.

Family **TRICHIURIDÆ.**

35. **Trichiurus nitens** Garman.

The material in this collection we cannot distinguish from *T. nitens* Garman. Meek & Hildebrand 1923, with eleven specimens of *T. lepturus* Linnæus from the Atlantic and four from the Pacific, believed that specimens from the two oceans were separable but did not feel justified in giving a new name on the basis of their material. It is not clear to us why they did not refer their Pacific

specimens to *T. nitens* which they do not mention. None of the thirty-two specimens overlaps their tentative limitations of variation given for their four Pacific specimens in a direction tending to show an intergradation of characters between the two oceans.

Figure 5 represents a specimen from San Filepe and Table III gives data on the significant measurements.

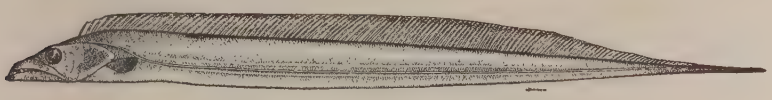

Fig. 5. *Trichiurus nitens* Garman.

TABLE III.—Proportions of *Trichiurus*.

	T. lepturus M. & H. Atlantic (11)	M. & H. Pacific (4)	*T. nitens* Garman Galapagos (several)	Specimens Pacific (32)
Total length mm.....	300 to 870	360 (1)	—	405 to 275
Maxillary.....	2.2 to 2.5	2.5 to 2.7	—	2.5 to 2.8
Dorsal rays (range)	126 to 137	120 to 128	120 to 127	120 to 126
Dorsal rays (average)....	132.9	122.5	—	122.3

A key may thus be constructed to separate these two forms as follows.

A. Dorsal rays never less than 126, usually about 133; maxillary 2.2 to 2.5 in head, usually about 2.3.....*lepturus.*

AA. Dorsal rays never more than 128, usually about 122; maxillary 2.5 to 2.8 in head, usually about 2.6.....*nitens.*

The range of *T. nitens*, as already suggested by Jordan, Evermann & Clark 1930, extends from the Galapagos Islands to Lower California.

1230 (1) Between San Filepe, Lower California and Shoal Point, Senora. May 20. Trawl. 17 faths.

1231 (4) do.

1232 (6) Off San Filepe. May 19. Trawl. 10 to 14 faths.

1233 (7) North of San Filepe Bay, Lower California. May 20. 14 faths.

1234 (4) North of San Filepe Bay, Lower California. May 20. 20 faths. Common. 20 specimens.

Family **CORYPHÆNIDÆ.**

36. **Coryphæna hippurus** Linnæus.

989 (1) Cape San Lucas Bay. April 17. At night.

991 (2) San Jose del Cabo Bay. April 14. At night with light.

Family **STROMATEIDÆ.**

37. **Palometa media** (Peters).

1050 (3) Lat. 30.28 N. Long. 114.34 W. May 18. Trawl.
1051 (6) San Filepe Bay. May 19.
831 (1) ——.
886 (5) ——.
938 (2) San Filepe Bay. May 19. Seine.

Family **CARANGIDÆ.**

38. **Decapterus hypodus** Gill.

817 (2) ——.
828 (1) ——.

39. **Trachurops brachychira** Gill.

832 (1) ——.
913 (1) Bahia Honda, Panama. April 6. Seine.

40. **Paratractus caballus** (Günther).

863 (2) Bahia Honda, Panama. April 5–6.
874 (1) Perlas Islands. April 2–3.

41. **Xurel vincta** (Jordan & Gilbert).

834 (2) ——.

42. **Xurel marginatus** (Gill).

833 (1) ——.
912 (5) Bahia Honda, Panama. April 6. Seine.

43. **Gnathanodon speciosus** (Forskål).

862 (1) Bahia Honda, Panama. April 5–6.
889 (2) ——.
891 (1) ——.
571 (1) San Francisco Island. Mounted.
582 (1) Mounted.

44. **Alectis hopkinsi** (Jordan & Starks).

The present material contains four specimens of sizes that warrant some discussion. The only tangible character that Nichols 1920 was able to note between *A. hopkinsi* and *A. crinitus* (Mitchill) was that of the gill-raker count; 12 for *hopkinsi* and 17 to 18 for *crinitus*. Meek & Hildebrand 1923, examined

small specimens 15 to 560 mm. from both sides of Panama, Virginia, Florida, Hawaii and New South Wales. They referred them all to *A. crinitus* and wrote, "We are unable to detect any differences." Their gill-raker count ranges from 13 to 15 on the lower limb. The present material has 13–2. The proportional characters refer it to *hopkinsi* (360 to 610 mm. standard length). The measurements of Nichols 1920 for *crinitus*, of Jordan & Evermann 1896 for *hopkinsi*, and of the present material, are given comparatively in Table IV.

The differences may not actually be as great as might be supposed from the table since Meek & Hildebrand counted the lower limb only (13 to 15), as presumably did Jordan & Evermann (12), whereas Nichols counted both limbs (17 to 18); while the present material counted either way is 13 or 15. The differences are thus evidently quite slight if not overlapping. As already suggested by Nichols it seems possible that in the Pacific there is a fish very like *A. crinitus* of the Atlantic growing up to the *hopkinsi* type as an adult, whereas the Atlantic form may retain the *crinitus* characters throughout life.

Regarding the loss of the thread-like fin rays it may be noted that the rays of the present material that presumably bore filaments in the *crinitus* stage are all split. This, at first glance, suggests that they might be different but it is noted that in no case does this split reach as far proximally as the absolute length of these rays of even the largest *crinitus*. Outlines of two of the present specimens which were mounted are shown in Figure 6, 610 and 360 mm. in standard length respectively.

TABLE IV.—Comparative Measurements of *Alectis crinitus* and *hopkinsi*.

	A. crinitus Nichols 1920						*A. hopkinsi* Specimens[1]				J & E[2]
mm. s. l.	51	66	95	112	163	178	360	380	540	610	661
Depth	1.0	1.0	1.3	1.2	1.5	1.6	2.0	1.9	1.9	2.1	2.0
Eye	2.8	2.5	3.0	3.2	3.5	3.6	4.1	4.4	4.5	4.2	3.8
Snout	3.5	3.0	3.0	3.3	3.4	3.3	2.6	2.8	2.6	2.4	2.75
Pectoral	1.0	—	1.0	1.0	0.9	0.9	0.7	1.1	0.9	1.2	0.9
Ventral	0.5	0.6	0.7	1.4	1.6	1.8	2.1	2.3	2.2	2.3	2.25
Dorsal Rays	18	18	18	18	18	18	19	19	18	19	18
Anal Rays	16	16	16	16	15	16	16	16	16	16	15
Scutes	—	10	15	13	15	14	13	15	14	13	12
Gill-rakers	18	18	18	18	17	18	—	13–2	13–2	—	12–0

[1] The specimens of 360 and 610 mm. are unfortunately mounted and consequently the gill-rakers are missing.

[2] The Jordan & Evermann measurements show some discrepancies with their illustration. In these cases the illustration has been used for the present figures.

Poey 1868 had a large specimen that he called *Scyris* which apparently represents a stage in the change from the long-rayed young to the short-finned adults. Poey's fish had no anal filament which Jordan & Evermann 1896 suggest may

have been "an accidental variation," or may have been broken off. The second dorsal ray was as long as the body. There is a large specimen in the American Museum of Natural History (19¾ inches) from Hawaii, which has the long filaments of the *crinitus* stage and which is mentioned by Nichols & Breder 1927. The writer has examined many *crinitus*, both living and dead taken in the vicinity of New York City (Sandy Hook Bay for most part) and has only seen

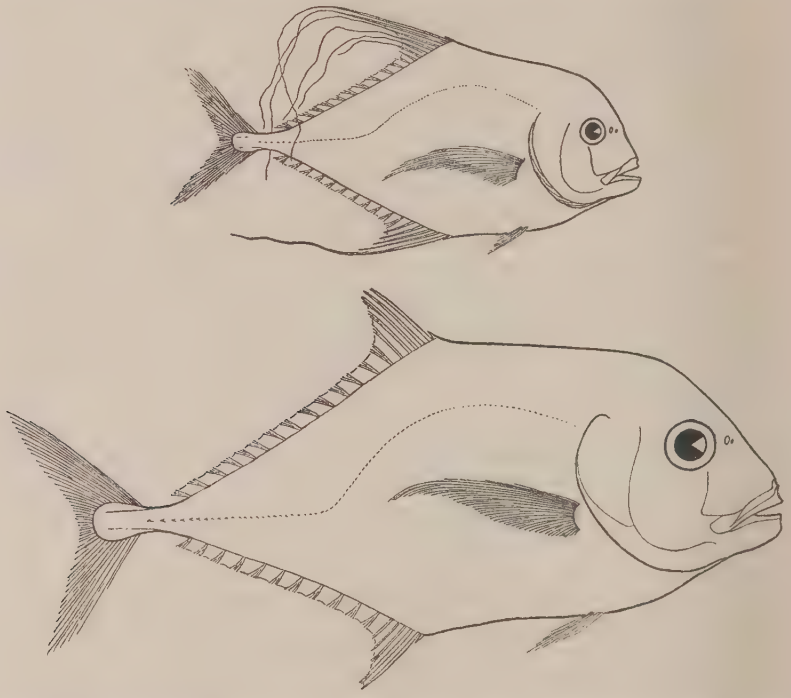

Fig. 6. *Alectis hopkinsi* (Jordan and Starks). Upper: 360 mm. in standard length. Lower: 610 mm. in standard length.

a few which did not show some sign of injury to the long trailing filaments. Some showed evidences of regeneration but most, especially the larger, showed simply healed stubs. At least one specimen, which lived in the New York Aquarium for over a year, although apparently healthy for a long time, failed utterly to regenerate any of the filaments broken at the time of capture. This suggests the possibility that at least the Pacific representatives may lose their juvenile filaments normally in this manner, somewhat after the fashion in which

the young of *Oxyporhamphus* lose their beaks, as shown by Nichols and Breder 1928. If this is the case the large example in the American Museum might be interpreted as a specimen that fortuitously escaped the early loss of such filaments and Poey's fish would represent a stage in this transition.

877 (2) ——.
567 (1) Mounted.
568 (1) Mounted.

45. **Vomer declivifrons** Meek & Hildebrand.

The largest specimen (888) shows the following measurements.

Standard length, 335 mm.; total length, 425 mm.; head, 3.2; depth, 2.2; maxillary 2.7; eye 6.0; snout 2.4; gill rakers, 29; dorsal VIII–I, 23½; anal II–I, 18½; pectorals, 2.7

1077 (7) Off White Friars, Mexico. April 12. 620 faths.
810 (3) St. Elmo Bay, Perlas Islands. April 1. Shore Coll.
888 (1) ——.
935 (1) Perlas Islands. March 31. Lat. 8.29.40 N. Long. 78.52.30 W. 19–24 faths.
943 (1) Off Terber Shoal, Mexico. June 1. Taken in trawl at night in 330 faths.

46. **Chloroscombrus orqueta** Jordan & Gilbert.

1070 (1) St. Elmo Bay, Perlas Islands. April 1. Dynamite. 20 ft.

47. **Trachinotus rhodopus** (Gill).

870 (1) Perlas Islands. April 2–3.
892 (1) ——.

48. **Trachinotus paloma** Jordan & Starks.

782 (1) San Francisquito, Gonzago Bay, San Filepe.
797 (1) San Francisquito Bay. May 7. No. 7.

49. **Oligoplites saurus** (Bloch & Schneider).

1235 (5) Conception Bay, Lower California. May 3.
907 (1) Conception Bay, Lower California. May 1. Seine.

50. **Seriola dorsalis** (Gill).

1236 (5) Conception Bay, Lower California. May 3.
944 (1) Cape San Lucas Bay. April 17. Surface at night.
990 (2) Salina Bay, Carmen Island. April 29. Surface at night.
588 (1) 98 pounds. Mounted.

Family **NEMATISTIIDÆ.**

51. **Nematistius pectoralis** Gill.

1025 (1) Conception Bay, Lower California.
825 (2) ——.
580 (1) San Francisco Island. Mounted.

Family **APOGONIDÆ.**

52. **Apogon retrosella** (Gill).

The largest specimen in the collection, 77 mm. standard length, approaches closely to the pattern of *A. atrodorsatus* Heller and Snodgrass. In the present series at least, the caudal spot and dorsal saddle fades and becomes more diffuse with an increase in size, accompanied by an increase in the pigmentation of the vertical fins.

1115 (6) Salina Bay, Carman Island, April 29. Dynamite.
1237 (4) Espiritu Santo Island. April 21.
951 (1) Carmen Island, Ballenas Bay. April 30.
934 (4) Hidden Harbor near Danzante. Seine and dynamite. April 24.
1238 (1) Cape San Lucas, Lower California. Dynamite. 24 ft.

53. **Apogon guadalupensis** (Osburn & Nichols).

1280 (1) Cape San Lucas. April 16. Dynamite. 25.

54. **Apogon parri** new species.

Type No. 682 Bingham Oceanographic Collection. Figure 7.

Standard length, 50 mm.; total length, 64 mm.

Head 2.4; depth, 2.9; dorsal VI–I, 9½; anal II, 8½; scales, 24.

Body rather short, compressed, ventral profile subequal to dorsal profile; caudal peduncle long, strongly compressed, its depth 2.4 in head; head large, compressed; interorbital space, 4.0, equal to snout which is blunt and shorter than eye; 1.1 in eye; eye, 3.8; mouth large, subinferior, maxillary reaching beyond posterior margin of pupil, 1.8; opercle with a weak spine; preopercle finely serrate; gill-rakers equal to pupil, 12 plus rudiments on lower limb of first arch; pseudobranchii well developed; scales large, finely ctenoid; lateral line complete, following dorsal outline; first dorsal rather low, the longest (second) spine 2.3 in head; second dorsal rather high, the longest ray (second) 1.8 in head; caudal fin forked, the lobes rounded, subequal; anal fin about equal to soft dorsal; ventral fins inserted slightly in advance of pectorals, nearly reaching origin of anal; pectorals moderate, reaching a little beyond origin of anal, 1.7 in head.

Coloration—Body plain except for a very distinct saddle-like mark descending

from the bases of the third to fifth rays of the second dorsal. This mark does not encroach at all on the fin proper and is not much wider than one scale row and fades out on the second scale row below the lateral line. The head is plain except for a distinct dusky stripe about as wide as the pupil extending from near the edge of the operculum, through the eye and around the blunt nose to join its fellow of the other side. Viewed head-on, the stripe is seen to restrict to about half its width across the snout from the upper margin. The fins are all without any markings visible to the naked eye. Under a glass the spinous dorsal reveals a very few large chromatophores on two of the interradial membrane.

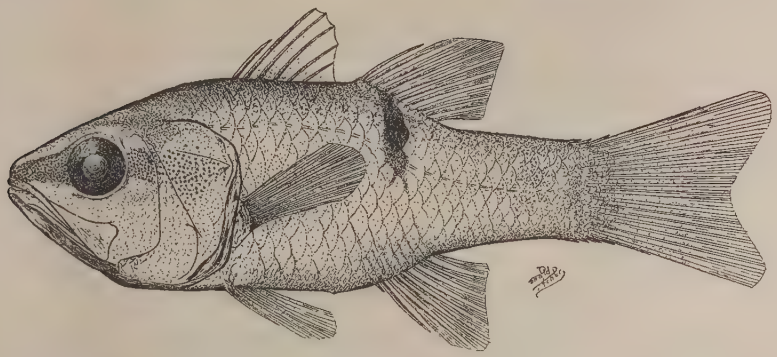

Fig. 7. *Apogon parri* new species. Type.

There are four paratypes ranging down to 43 mm. in standard length. The specimens are all in close agreement. The slight size range shows no shift in pattern conformation or other characters. All are mature. Two of the paratypes have their mouths crammed full of eggs. In one, the eggs have apparently been squeezed out through the gill openings and are adhering to the head and pectoral fins. They are very small and show no sign of a developing embryo. In diameter the eggs range from about 0.35 to 0.45 mm. with an average of 0.40 mm.

Named for Prof. A. E. Parr in recognition of his capable handling of The Bingham Collection.

1239 (1) Type. Cape San Lucas, Lower California. April 16. Dynamite. 25 ft.

1240 (4) Same data.

According to the present understanding, the species of *Apogon* from the west coast of America may be separated on a basis of color and pattern by the following key.

KEY TO EASTERN PACIFIC APOGON.

A. A dark saddle-like mark on back under origin of soft dorsal.
B. A dark round spot on peduncle, this and saddle becoming faint and suffuse with age; saddle continued upward on soft dorsal to tip, anal and caudal dusky on distal portions. . . . . *retrosella* (Gill).
BB. No peduncular spot, saddle not suffuse in adult; no continuation of saddle on dorsal; all fins hyaline except extreme tip of soft dorsal, which is sometimes faintly dusky. . . . . *parri*, new species
AA. No dark saddle-like mark.
C. A dark round spot on peduncle, tip of soft dorsal, anal and caudal lobes dusky. . . . . *dovii* Günther.
CC. No peduncular spot.
D. Both dorsal fins plain; anal tipped with dusky and caudal dusky. . . . . *atricaudus* (Jordan & McGregor).
DD. Only one dorsal fin plain.
E. First dorsal plain, second tipped with dusky, anal tipped with dusky, caudal dusky. . . . . *atrodorsatus* Heller & Snodgrass.
EE. Second dorsal plain, first dorsal with central rays blackish for their entire length, anal plain, caudal dusky with a distinct pale edge. . . . . *guadalupensis* (Osburn & Nichols).

Family **SERRANIDÆ.**

55. **Enneistus acanthistius** (Gilbert).

A single large specimen is referred to this species with some question. The much smaller type specimen agrees fairly well except for characters that may be accounted for by age and size. Unfortunately the fish has been mounted, which process has removed certain features. It may be described as follows.

Standard length 688 mm.; total length about 902 mm. (tail broken). Head, to end of flap 2.5; depth 2.4; dorsal, IX, 17½; anal III, 9½; scales 103 (approximate); dorsal insertion to lateral line 13; anal insertion to lateral line 34.

Body deep, robust; head, large; snout, 4.0; eye, 11.2; 2.9 in snout (distorted in mounting?); maxillary very broad, 2.1 with a distinct supplemental bone; teeth all pointed, in bands, 2 canines near tip of lower jaw, none in upper; preopercle with fine but much worn serrae; opercular spines flat and blunt, the central one longest; scales moderate, cycloid on head, weakly ctenoid on body; maxillaries naked; scales on opercles slightly smaller than those on body; those on cheeks about ½ that size. Caudal fin worn but probably truncate; third dorsal spine longest, 2.7 in head; ventrals 2.0; interorbital 4.9 (1.2 in snout). Membranes of spinous dorsal deeply incised anteriorly, see Figure 8.

The lateral line pores open between rows of scales, not through the center of scales and in this region there are a variable number of very small accessory scales, very much as in the related *Cephalopholis fulvus* (Linnæus) of the Atlantic. Dr. G. S. Myers and Mr. E. D. Reid of the United States National Museum,

very kindly examined the type of *E. acanthistius* in this regard and report that the appearance is that "the pores do not open through the scales but appear to originate through the rows of scales causing an indentation in the lower margin of the upper row and upper margin of the lower row adjacent to the lateral line" but that even under a glass there seems to be "no indication of small accessory scales surrounding the lateral line pores." This is not surprising, since the type is a fish of only about half as large as the present specimen, especially as the examination of a considerable series of *C. fulvus* showed that the smaller fish generally had few or no accessory scales and the larger all had many.

Color almost uniform dusky rose, tips of dorsal spines darker; anal and caudal slightly brownish distally; body scarcely lighter below. There is a faint dusky

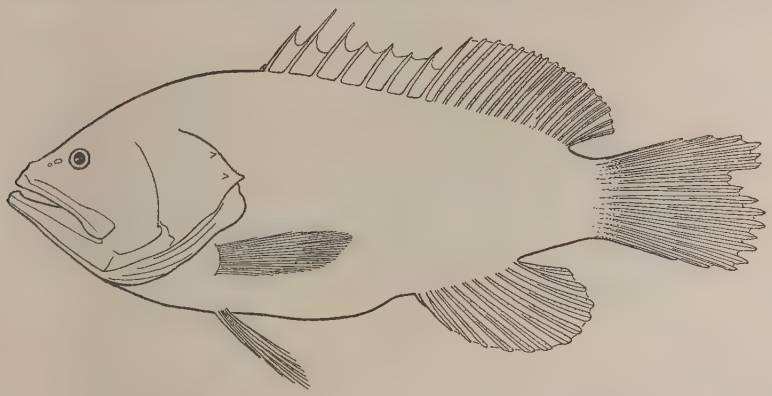

Fig. 8. *Enneistus acanthistus* (Gilbert). 688 mm. standard length.

area behind the maxillary which may represent that described for the type. Eye with a yellow ring around pupil flecked with red. This surrounded by a dark red ring flecked with blue. This description of coloration is based on the colors given the fish by the taxidermist.

The specimen is evidently an old fish that has been through various vicissitudes.

593 (1) ——.

56. **Epinephelus analogus** (Gill).

852 (1) ——.
589 (1) Mounted.

57. **Epinephelus labriformis** (Jenyns).

868 (1) Bahia Honda, Panama. April 5–6.
876 (1) Perlas Islands. April 2–3.

58. **Alphestes multiguttatus** (Günther).

1075 (1) San Diego Rocks. April 25. Dynamite. 4 faths.
1241 (1) ——.

59. **Alphestes immaculatus** new species.

Type No. 596 Bingham Oceanographic Collection. Figure 9.

Standard length, 82 mm.; total length, 101 mm.

Head 2.6; depth 2.9; dorsal XI, 17½; anal III, 9½; scales about 64.

Body oblong, compressed; dorsal profile anteriorly gently convex; head long, rather low; snout acute, 5.0 in head; eye, 4.3; mouth large, oblique; lower jaw projecting, maxillary reaching posterior margin of pupil, 2.5; teeth all pointed,

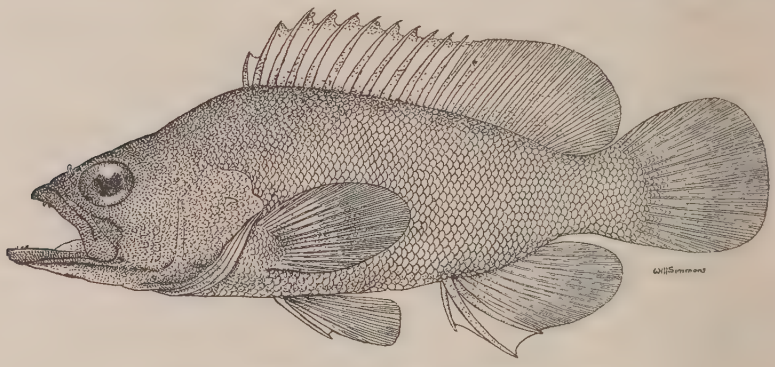

Fig. 9. *Alphestes immaculatus* new species. Type.

in narrow bands, present on jaws, vomer and palatines; the movable teeth in anterior part of upper jaw somewhat enlarged, fixed canines in advance of these scarcely evident; preopercular margin finely serrate with a well developed antrorse hook at its lowest posterior angle; opercle with 3 flat spines, the middle one longest, strongest and narrowest; gill-rakers about as long as filaments; 14 on lower limb of first arch, including rudiments; scales small, weakly ctenoid, difficult to count, those on head imbedded; dorsal fin long, the spines graduated to the third and from there on about equal. The soft part higher than the spinous, with evenly rounded convex margin, the longest ray 2.1 in head; caudal fin rounded; anal with 3 strong spines, the second reaching tip of the third when depressed; ventral fins moderate, reaching a pupil past vent, inserted slightly behind pectorals, midway between tip of lower jaw and insertion of last anal ray; pectorals moderate, rounded, the lower rays shortest, 1.5 in head.

Coloration—Almost uniform olive-tan, probably greenish in life, head a little darker and browner, tips of membranes between first six dorsal spines

darkened, ventrals dusky, pectorals with six faint cross bands, anal spines dusky, otherwise plain except the bases of all fins which are slightly darker, scarcely lighter below.

That this specimen is not simply an unmarked young example of *multiguttatus* is evident from the following notes of differences other than color and pattern.

At this size the preopercular antrorse hook is undeveloped in *multiguttatus*, it being represented by a bifid spine which grows forward later. In the present species there is no suggestion of a bifid spine and the antrorse hook is as well developed as in an adult *multiguttatus*. The ventrals are inserted farther back in this species, the scales are considerably larger and the maxillary is shorter than in even smaller *multiguttatus*. These characters, together with others, suggestive of the young of *multiguttatus* suggests that *immaculatus* may remain at a permanently small size, a fixed juvenile form of the more southerly *multiguttatus*.

A key separating these two species may be as follows:

A. Scales about 70 to 80; ventrals inserted midway between tip of lower jaw and middle of anal; body and head variously, but always profusely spotted. *multiguttatus*.

AA. Scales about 60; ventrals inserted midway between tip of lower jaw and end of anal base; coloration plain, no spots.....*immaculatus*.

60. **Dermatolepis punctatus** Gill.

569 (1) Mounted.

61. **Trisotropis boulengeri** (Jordan & Starks).

924 (1) Gonzago Bay. May 17. Seine. Reaches a weight of 50 pounds or more.

590 (1) Cape San Lucas. Mounted.

62. **Trisotropis jordani** (Jenkins & Evermann).

776 (1) San Francisquito, Gonzago Bay, San Felipe.

63. **Trisotropis xenarchus** (Jordan).

591 (1) Rey Island, Perlas Islands. Mounted.

64. **Mycteroperca rosacea** (Streets).

The present smaller example of 226 mm. s. l. (788) shows only such variations as would be expected with a lesser size and the larger of 480 mm. s. l. (823) similar ones.

788 (1) San Francisquito, Gonzago Bay, San Filepe.

823 (1) ——.

583 (1) Mounted.

65. **Xystroperca pardalis** (Gilbert).

1116 (1) Gonzago Bay. May 17. Trawl.
1242 (1) Salina Bay, Carmen Island. April 29. Dynamite.
1243 (1) Espiritu Santos Island. April 21.
1244 (4) San Francisco Bay, Mexico. May 7. Seine.
824 (2) ——.
910 (6) Conception Bay. May 3.
950 (1) Carmen Island, Ballena Bay. April 30.
592 (1) Mounted.
597 (5) Angelus Bay. May 13. Otter trawl. 17 to 23 faths.

66. **Rypticus xanti** Gill.

1056 (1) Espiritu Santos. Seine.
Also the following material.
921 (gill-arches preserved to show pharyngeal bones. Taken from a grouper 33 inches long. In color like *E. morio*). Angeles Bay. May 13.

67. **Paralabrax maculatofasciatus** (Steindachner).

1117 (3) Angelus Bay. May 12. Hand line.
799 (1) San Francisquito Bay. May 7. No. 7.
822 (2) ——.
851 (1) ——.
946 (5) Tiburon Island. May 25. Seine.

68. **Diplectrum pacificum** Meek & Hildebrand.

A series of eleven from one place show some interesting variations in the development of the preopercular spines. One of nearly the exact size of the type bears a remarkably close resemblance to it but as one progresses away from it in size, changes become evident in the arrangement of the preopercular spines. The series ranges from 85 mm. s. l. to 158 mm. While there is great variation in the number, length and direction of these spines there is a general tendency for them to spread with size so that in the larger specimens the condition approaches that of *D. formosus* Linnæus, the spines appearing to radiate from two centers. A fish of 134 mm. shows this most strongly.

All these specimens have the lateral stripes broken up into spots (about 10 or 11) which are partly connected from one to another vertically by faint shades giving the suggestion of bands.

798 (1) San Francisquito Bay. May 7. No. 7.
1245 (11) Angeles Bay. May 13.
1246 (1) Conception Bay, Lower California. May 1. Seine.
1247 (7) Conception Bay, Lower California. May 1. Hand line.
879 (2) ——.

1248 (4) Lat. 14.40.20 N. Long. 92.40.30 W. April 9. No. 4 otter trawl. 19 faths.
829 (1) ——.
932 (4) Lat. 30.28 N. Long. 14.34 W. May 18. 26 faths.

69. **Prionodes fasciatus** Jenyns.

922 (1) San Francisco Bay. May 7. Seine.
923 (1) Espiritu Santos Island. April 20. Hand line.
953 (2) Gonzago Bay. May 17.

70. **Paranthias furcifer** (Cuvier & Valenciennes).

The red washing on two of the present specimens (1155) is retained even after a year in strong formalin. The dorsal and ventral edges of the caudal are pale reddish in a pattern similar to the black caudal edgings of *Chromis strilobatus* Gill. It is noted that the gill-rakers are a bright red.

578 (1) Cape San Lucas. Mounted.
1155 (2) Aqua Verde. April 26.
794 (1) 247.
878 (2) ——.

Family **HOPLOPAGRIDÆ.**

71. **Hoplopagrus guntheri** Gill.

861 (1) Bahia Honda, Panama. April 5–6.
577 (1) Bahia Honda, Panama. Mounted.

Family **LUTIANIDÆ.**

72. **Evoplites viridis** (Valenciennes).

As noted on the label by Mr. Mowbray, this is apparently the first record from Lower California.

1033 (1) San Jose del Cabo, Lower California. Hand line. First record from Lower California.

73. **Lutianus jordani** (Gilbert).

858 (1) ——.

74. **Lutianus novemfasciatus** (Gill).

570 (1) Mounted.

75. **Lutianus guttatus** (Steindachner).

In specimens of over 160 mm. s. l. the lateral spot fades and nearly disappears. In the very small examples of 150 mm. and under, the maxillary reaches to or

nearly to the pupil. As size increases it becomes proportionately shorter until in the large examples of 300 mm. and over it scarcely reaches the front of eye. The pattern is variable and the fish is apt to be nearly plain. In all our examples, however, the narrow black edging of the central caudal rays is pronounced, no matter what the nature of the other parts of the pattern may be, although it becomes somewhat narrower with size.

A full description of our largest specimen is given below, part of No. 775. Standard length 382 mm., total length 461 mm.

Head, 2.75; depth 2.9; dorsal X, 13½; anal III, 8½; scales in horizontal series below lateral line 47.

Body moderately compressed; the dorsal region elevated; anterior profile slightly concave over anterior part of snout; head large, snout not especially pointed, 2.9; eye small, 6.3; mouth small, low, terminal, slightly oblique; maxillary scarcely reaching front of eye, 3.0; upper jaw with 3 anterior canines on left side (1 on right); lateral teeth somewhat smaller and hidden by thick lip; anterior canines in lower jaw scarcely larger then lateral teeth; vomerine teeth in an anchor shaped patch with a long median prolongation; teeth on palatines and tongue in bands; preopercular margin finely serrate, with a slight indentation above its lower posterior angle; gill-rakers moderate, 10 on lower limb of first arch; scales moderate, the series above lateral line parallel with it, those below lateral line horizontal, 9 rows between lateral line and origin of dorsal; caudal fin mostly covered with small scales; soft parts of dorsal and anal with a sheath of scales along base and smaller scales on interradial membranes, graduated in size and disappearing altogether a little beyond middle of fin; pectorals with scales on base only; ventrals naked; dorsal fin somewhat notched, the spines strong, the third and fourth longest, a little longer than snout, the soft part convex behind; anal with 3 strong spines, the second strongest but slightly shorter than the third, equal to 3/5 longest dorsal spine, the soft portion high pointed behind, the fourth ray longest, posterior margin concave; caudal deeply concave posteriorly; ventrals inserted an eye's diameter nearer anal origin than tip of lower jaw; pectorals moderate, 1.3 in head.

Coloration—Light, rather uniform tan, a little lighter below. Each scale above the pectoral axil has a faint dark center which gives the impression of streaks on the sides. The fins are all pale and plain except the very tips of the central caudal rays which are dark. The pectoral axil is dark as in *Lutianus campechanus* (Poey). If other colors were present they are not evident in this preserved specimen.

775 (3) San Francisquito, Gonzago Bay, San Filepe.
1249 (1) San Francisquito Bay. May 7. No. 7.
900 (1) ——.
914 (3) Bahia Honda, Panama. April 6. Seine.
1061 (4) Gonzago Bay, Lower California. May 17. In trawl.

1250 (5) Angelus Bay. May 13. Otter trawl. 17 to 23 faths.
1096 (9) Bahia Honda, Panama. April 6. Seine.
1251 (1) Conception Bay. May.
1252 (2) Lat. 14.40.20 N. Long. 92.40.30 W. April 9. 9 faths. No. 4 trawl.

76. **Raizero aratus** (Günther).

860 (1) ——.

77. **Rabirubia inermis** (Peters).

579 (1) San Jose del Cabo. Mounted.

Family **HÆMULIDÆ.**

78. **Hæmulon sexfaciatum** Gill.

1118 (4) San Francisco Bay, Mexico. May 7. Seine.
796 (1) San Francisquito Bay. May 7. No. 7.
1253 (1) Conception Bay, Lower California. May 1. Seine.
875 (1) Perlas Islands. April 2–3.
885 (1) ——.

79. **Lythrulon flaviguttatum** (Gill).

The specimens from Puerto Refugio (996) were much more of a yellowish cast than the rest; the pearly gray spots were almost obsolete and the soft dorsal and anal had a pinkish cast. They may represent a race, although those from Tiburon Island (997) of about the same size (80 mm.) were gray like the others.

1254 (11) Conception Bay, Lower California. May 3.
816 (1) St. Elmo Bay, Perlas Islands. April 1.
908 (6) San Francisco Bay. May 4.
916 (1) Bahia Honda, Panama. April 6. Seine.
996 (22) Puerto Refugio, Angel de la Guarda. May 15. Seine.
997 (5) Tiburon Island. May 25. Seine.
562 (1) ——.

80. **Orthostœchus maculicauda** Gill.

1098 (3) Bahia Honda, Panama. April 6. Seine.
563 (1) ——.

81. **Paraconodon orthopristis** new species.

Type No. 564 Bingham Oceanographic Collection. Figure 10. Standard length 238 mm., total length 277 mm.

Head 2.9; depth 2.7; dorsal XII, 13½; anal III, 9½; scales 44.

Body compressed; anterior profile slightly convex over nape, straight over eyes and snout; snout long, 3.1 in head; eye small 5.1; mouth small, terminal, slightly oblique; maxillary not nearly reaching eye, 3.7; teeth all small, in villiform bands, the outer ones not noticeably enlarged; preopercle finely serrate, the lower serrae largest; gill-rakers short, 12 more or less developed on the lower limb of the first arch; scales moderate, weakly ctenoid, not enlarged anteriorly above lateral line, the series parallel with it, 7 rows between the lateral line and origin of dorsal; 14 rows between the lateral line and origin of anal; dorsal fin long, the spines strong, the fourth longest, 2.3 in head, slightly exceeding the snout and half eye; the soft part low, highest anteriorly; small scales present on

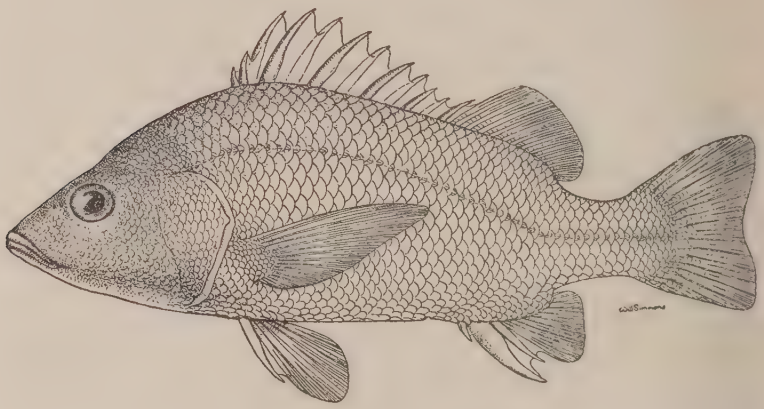

Fig. 10. *Paraconodon orthopristis* **new species. Type.**

interradial membranes just in back of each ray; caudal fin emarginate, the upper lobe the longer, slightly pointed, the lower lobe more rounded, the fin mostly covered with small scales; anal fin with 3 strong spines, the second enlarged but not quite reaching tips of soft rays when deflexed, 1½ times the longest dorsal ray; the soft portion of the anal short, the anterior rays the longest; ventral fins moderate, 1½ in pectorals, inserted midway between tip of chin and origin of anal; pectoral fins moderate, falling short of anal by over an eye's length, 3.2 in body.

Coloration—Dusky brown above, lighter below, most of the scales with a brownish margin, snout and upper parts of head darker; margin of opercle dark, ventrals slightly dusky, other fins slightly less so, a suggestion of two diagonal dusky bands reaching down from in front of origin of dorsal and fifth spine, the latter pointing toward the origin of the anal and the first parallel to it.

This species is close to *P. cæsius* (Jordan & Gilbert) and *P. pacifici* (Günther) but is readily distinguished by the characters given in the accompanying key.

Named *Orthopristis* in allusion to the resemblance of the forepart of the head to that genus.

564 (1) Type ——.

82. **Anisotremus interruptus** (Gill).

815 (1) St. Elmo Bay, Perlas Islands. April 1.

83. **Anisotremus mowbrayi** new species.

Type No. 565 Bingham Oceanographic Collection. Standard length 252 mm., total length 305 mm. Figure 11.

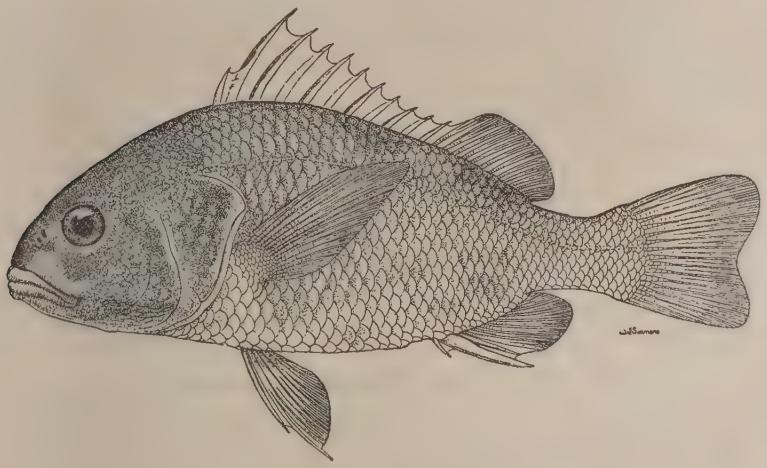

Fig. 11. *Anisotremus mowbrayi* new species. Type.

Head 2.7; depth 2.8; dorsal XII, 13½; anal III, 8½; scales 43.

Body not deep for an *Anisotremus*, compressed; anterior profile stongly convex, extending in a smooth curve from dorsal origin to snout; head moderate; snout moderate 3.3 in head; eye small, 5.9; mouth moderate, terminal, very slightly oblique; maxillary reaching anterior margin of eye, 3.2; teeth all small, in villiform bands, the outer ones not noticeably enlarged, preopercle finely serrate, the lower serrae largest; gill-rakers moderate, 13 on lower angle of first arch; scales moderate, finely ctenoid, not enlarged anteriorly above lateral line, the series parallel with it, 6 rows between the lateral line and origin of dorsal; 12 rows between the lateral line and origin of anal; dorsal fin long, the spines rather

slender, the third longest, 2.1 in head, reaching from snout to past eye; soft dorsal rather high; highest anteriorly; practically no scales on the interradial membranes; caudal fin well forked, the lobes about equal, the fin mostly covered with small scales; anal fin with 3 strong spines, the second enlarged, but not reaching the tips of any rays when deflexed, 1½ times the longest dorsal ray; the soft part of anal rather long, the anterior rays the longest; ventral fins moderate, 1 1/3 in pectorals, inserted midway between angle of gape and anal origin; pectorals moderate, reaching anal origin, 3.3 in body.

Coloration—Brownish above, lighter below, each scale on upper anterior part of body with a dark spot at its base somewhat as in *A. interruptus* (Gill.), a dark blotch at upper angle of opercle, snout and upper anterior part of head dark, fins somewhat dusky, a dark line on membranes of spinous dorsal just anterior to each spine.

This species is readily distinguished from others by the combination of characters described above. This and the preceding strongly suggest the advisability of the erection of new genera, but as both species are based on a single specimen each, it is considered best to await an opportunity to examine more material.

Named for Mr. L. L. Mowbray who directed the collecting of the first two "Pawnee" expeditions.

565 (1) Type ——.

84. **Anisotremus davidsonii** (Steindachner).

1053 (1) Gonzago Bay. May 17. Seine.
787 (1) San Francisquito, Gonzago Bay, San Filepe.
859 (1) ——.

85. **Brachydeuterus axillaris** (Steindachner).

998 (1) Gonzago Bay. May 17. Seine.
999 (7) Conception Bay. May 1. Seine.
560 (2) ——.

86. **Rhencus panamensis** (Steindachner).

1255 (1) May 22. Trawl. 17 faths.
1205 (15) Angelus Bay. Otter trawl. 23 faths. May 13.
1206 (1) Between San Filepe and Shoal Pt., Rio Colorado. Trawl, 10–14 faths. May 19.

87. **Orthopristis chalceus** (Günther).

1256 (1) San Filepe Bay. May 19. Seine.
801 (1) San Francisquito Bay. May 7. No. 7.

88. **Orthopristis reddingi** Jordan & Evermann.

995 (16) Conception Bay. May 3.
1054 (2) Off Georges Island, Senora. May 23. Hand line.
561 (1) ——.

89. **Microlepidotus inornatus** Gill.

598 (1) ——.
599 (1) ——.
1034 (1) Angel de la Guardia Island. Seine.
1257 (3) Conception Bay, Lower California. May 1. Seine.

KEY TO EASTERN PACIFIC HÆMULIDÆ.

A. Soft parts of vertical fins densely scaled to their edges; mouth red within.
B. Scale series above lateral line in oblique series, not parallel to lateral line.
C. Mouth not very oblique, jaws subequal or the lower included; gill-rakers 10 to 14 on lower limb; dorsal spines 12 or 11; frontal foramen a single or divided slit. Snout 2.1 to 2.8.
D. Maxillary 2.5 to 2.75, not reaching center of eye (in adult).
E. Scales from lateral line to first dorsal spine in 9 oblique series; sides with about 6 dark vertical bars; sides of head with blackish spots like those of body; head 3; depth 2.4; scales 51; dorsal XII, 17; anal III, 9.
Hæmulon sexfaciatum Gill.
EE. Scales from lateral line to first dorsal spine in 7 oblique series; sides with dark dotted lines on scale rows; head unspotted; head 3.1; depth 2.5; scales 49; dorsal XI, 16 or XII, 15; anal III, 7.....*Hæmulon scudderi* Gill.
DD. Maxillary 2.0, reaching center of eye; scales from lateral line to first dorsal spine in 7 oblique series; sides with light dotted lines on scale rows, a black blotch at caudal base; head 3.0; depth 2.8; scales 50; dorsal XI, 16; anal III, 8.
Hæmulon steindachneri (Jordan and Gilbert).
CC. Lower jaw projecting beyond upper; gill-rakers 15 to 22 on lower limb; dorsal spines 12 or 13; frontal foramen 2 short slits close together; snout 3.6 to 4.0; a small pale spot on each scale.
F. Depth of body 3.0; snout 4.0; gill-rakers 10 + 22.
Lythrulon flaviguttatum (Gill).
FF. Depth of body 2.6; snout 3.6; gill-rakers 8 + 15.
Lythrulon opalescens Jordan and Starks.
BB. Scale series above lateral line not oblique; parallel to lateral line; dorsal spines 13 or 14; frontal foramen oval; lower jaw projecting; light stripes on scale rows; base of caudal dusky.....*Orthostœchus maculicauda* Gill.
AA. Soft parts of vertical fins naked or with scales only on their basal parts; mouth not red within.
G. Anal fin short, its rays III, 7 to III, 10; dorsal spines stout, the fin somewhat emarginate.
H. Body ovate, the back elevated; depth greater than length of head; lips thick; outer teeth of upper jaw enlarged; second anal spine strong; soft dorsal and anal scaly at base.

I. Scales above lateral line in series parallel with lateral line.
J. Dorsal spines rather low, the longest not more than ½ head; second anal spine ½ head.
K. Pectorals shorter than head; dorsal XI to XII, 13 or 13½; eye over twice width of preorbital.
L. Pectorals not reaching tips of ventrals; dorsal XI, 13; the longest spine 2 in head; grayish with 4 irregular cross-bars..... *Paraconodon pacifici* (Günther).
LL. Pectorals reaching past tips of ventrals, nearly to anal; dorsal XII, 13½, the longest spine 2.3 in head; sides with 2 faint diagonal dusky bands.
Paraconodon orthopristis n. sp.
KK. Pectorals a little longer than head, about reaching anal fin; dorsal XII, 16, the longest 2.5 in head; eye about .25 wider than preorbital; body with faint streaks and a dusky band from dorsal to pectoral insertion.
Paraconodon cæsius (Jordan and Gilbert).
JJ. Dorsal spines high, the longest 1.6 in head; second anal spine 1.75 in head; 5 black cross bands on body..... *Paraconodon dovii* (Günther)
II. Scales above lateral line in oblique series not parallel to it.
M. Scales between lateral line and dorsal origin large, in 6 or 7 series.
N. Dorsal XII, 16; lateral line 52..... *Anisotremus interruptus* (Gill).
NN. Dorsal XII, 13½; lateral line 43..... *Anisotremus mowbrayi* n. sp.
MM. Scales rather small, more than 9 between dorsal and lateral line.
O. Body not striped longitudinally with blue; preorbital narrow; gill-rakers 13 on lower limb.
P. Anterior part of body without dark vertical bar; a round black spot on last rays of dorsal and anal; body dark gray with darker streaks, fins pale.
Anisotremus scapularis (Tschudi).
PP. Anterior part of body with a dark vertical bar, a dark humeral bar reaching from between the 5th and 7th dorsal spines to lower edge of pectoral.
Anisotremus davidsonii (Steindachner).
OO. Body with about 6 blue stripes which are edged with darker blue; anterior part of body with two broad dark cross-bars..... *Anisotremus tæniatus* Gill.
HH. Body oblong, the depth equal to or less than the head; lips not very thick; scales large, those above lateral line mostly parallel with it.
Q. Preopercle sharply serrate, those at angle much enlarged, those below antrorse; outer teeth in both jaws considerably enlarged; second anal spine strong; soft fins somewhat scaly; dusky above with about 7 short bars on back, fins pale..... *Conodon serrifer* Jordan and Gilbert.
QQ. Preopercle finely serrate, those of the angle scarcely enlarged; those below not antrorse; teeth subequal or the outer in upper jaw slightly enlarged.
R. Soft dorsal and anal with a series of small scales on the membranes behind each ray; anal spines small or moderate, the second little, if any, longer or stouter than third; lower than soft rays; body not notably elevated, if at all; scales above lateral line parallel with back; dorsal XII, 15 or 16; outer teeth in upper jaw slightly enlarged.
S. Pectoral fins short, much shorter than head, no axillary spot encroaching on pectoral fin, anal spines very small.

T. Preorbital not as broad as eye, a black blotch at origin of lateral line about size of eye; dark streaks on scale rows. *Brachydeuterus nitidus* (Steindachner).

TT. Preorbital broader than eye, no black blotch at origin of lateral line, a light lateral stripe about one scale wide, one faint dark band above this and below. *Brachydeuterus leuciscus* (Günther).

SS. Pectoral fin long, nearly equal to head, a large black axillary blotch encroaching in the pectoral fin rays; back and sides with dark stripes. *Brachydeuterus axillaris* (Steindachner).

RR. Soft dorsal and anal scaleless, except for a low sheath at base; anal spines strong, the second much larger than third; dorsal XII or XIII, 12 to 14.

U. Teeth in both jaws villiform, more enlarged; preopercle weakly serrate, dorsal XII, 13; a distinct dark blotch on opercle and a fainter one on sides. (Young with 6 faint cross shades)..... *Rhencus panamensis* (Steindachner).

UU. Teeth in both jaws in villiform bands, those in the outer series of upper jaw more or less enlarged, preopercle sharply serrate.

V. Dorsal XII, 12 or 13; preorbital broad.

W. Mouth large, maxillary reaching to anterior third of eye, about 2.6 in head, scales 8–56–20, uniform coloration. *Pomadasys bayanus* Jordan and Evermann.

WW. Mouth small, maxillary not reaching beyond anterior edge of orbit, about 3.3 in head; scales 7–48–14; 4 broad transverse bands extending downward from back to level of pectoral..... *Pomadasys macracanthus* (Günther).

VV. Dorsal XIII or VIX, 12; preorbital narrow; scales 6–54–16; color uniform, with the base of each scale slightly darker *Rhonciscus branicki* (Steindachner).

GG. Anal fin long and low, its rays III, 10 to III, 13; dorsal low, usually not deeply emarginate.

X. Dorsal XII or XIII, 15 or 16.

Y. Scales of body without series of small accessory scales at base.

Z. Jaws subequal; scales 9–58–18, pale streaks along edges of scale rows, a pale streak under base of dorsal; soft dorsal mottled with darker. *Orthopristis chalceus* (Günther).

ZZ. Lower jaw included; scales 8–52–15, each scale a bronze spot, forming streaks; dorsal somewhat streaked and mottled. *Orthopristis reddingi* Jordan and Richardson.

YY. Scales of body each with a cluster of small accessory scales at base, soft dorsal and anal with series of small scales on membranes; scales 10–65–20, faint dark stripes following scale rows..... *Microlepidotus brevipinnis* (Steindachner).

XX. Dorsal XIV, 15, scales 9–80–20, light lines following scale rows. *Microlepidotus inornatus* Gill.

Family **SPARIDÆ.**

90. **Calamus brachysomus** (Lockington).

1121 (2) Angelus Bay. May 13. Otter trawl. 17 to 23 faths.

786 (1) San Francisquito, Gonzago Bay, San Filepe.

857 (3) ——.

901 (1) ——.

926 (1) Gonzago Bay. May 17. Seine.
927 (1) Conception Bay, Lower California. May 3.
930 (5) San Francisco Bay, Mexico. May 7. Seine.
945 (24) Tiburon Island. May 25. Seine.

91. **Salema pourtalesii** (Steindachner).

Possibly referable to the Atlantic *S. rhomboidalis* (Linnæus), included in the collection in error.

856 (12) ——.

Family **GIRELLIDÆ.**

92. **Girella nigricans** (Ayers).

779 (2) San Francisquito, Gonzago Bay, San Filepe.
802 (1) San Francisquito Bay. May 7. No. 7.
896 (1) ——.
909 (12) Gonzago Bay. May 17. Seine.

93. **Incisidens simplicidens** (Osburn & Nichols).

780 (1) San Francisquito, Gonzago Bay, San Filepe.

Family **KYPHOSIDÆ.**

94. **Kyphosus elegans** (Peters).

836 (1) ——.
837 (1) ——.
872 (1) Perlas Islands. April 2 to 3.

95. **Sectator ocyurus** (Jordan & Gilbert).

873 (1) Perlas Islands. April 2 to 3.

96. **Hermosilla azurea** Jenkins & Evermann.

778 (1) ——.
895 (1) ——.

Family **GERRIDÆ.**

97. **Eucinostomus elongatus** Meek & Hildebrand.

1097 (1) Bahia Honda, Panama. April 6. Seine.

98. **Eucinostomus californiensis** (Gill).

One specimen (1168) is referred to the present form largely on its locality data and is very close to *E. elongatus*. The second anal spine is scarcely stronger than the third and the body depth is 3.4 or just a shade deeper than the greatest depth given for that race.

1258 (1) Conception Bay, Lower California. May 3.
854 (4) ——.
871 (1) Perlas Islands. April 2–3.
918 (3) Bahia Honda, Panama. April 6. Seine.
928 (6) Conception Bay, Lower California. May 3.
929 (6) Conception Bay, Lower California. May 1. Seine.
931 (1) San Francisquito Bay. May 12.
933 (15) Hidden Harbor. Near Danzante Island. April 27. Seine and Dynamite.
948 (2) Carmen Island, Ballenas Bay. April 30.
972 (2) Perlas Islands, Rey Island. March 31. Seine.

99. **Diapterus peruvianus** (Cuvier & Valenciennes).

855 (2) ——.

Family **MULLIDÆ.**

100. **Upeneus dentatus** Gill.

791 (1) ——.

101. **Upeneus grandisquamis** Gill.

Eight specimens of this species ranging from 133 to 94 mm. in s. l. show some differences from the described coloration. The two dark lateral blotches are absent in all except two in which they are only faintly suggested. In four the sub-lateral line rose color suffuses above it in blotches and in one of these reaches the dorsal outline. The color is strong even in this preserved material. It is possible that a distinguishable race is here represented but as there is no locality data it would be of scant value to discuss it further as the proportional measurements agree with descriptions.

There are also two from Conception Bay of 115 and 95 mm. s. l. in which the red is entirely faded but the dusky blotches apparent.

1028 (2) Conception Bay, Lower California. May 3.
1027 (8) ——.
792 (1) ——.
730 (1) April 9. Trawl. 19 faths.
1074 (1) San Diego Rocks. April 25. Dynamite. 4 faths.
1259 (1) Conception Bay, Lower California. May 1. Seine.
1180 (1) St. Elmo Bay, Perlas Islands. April 1. Shore Coll.

Family **SCIÆNIDÆ.**

102. **Bairdiella ensifera** (Jordan & Gilbert).

848 (1) —— .

103. **Bairdiella icistia** (Jordan & Gilbert).

1260 (1) San Filepe Bay. May 19. Seine.

104. **Ophioscion strabo** Gilbert.

1208 (5) Between San Filepe and Shoal Point, Rio Colorado. Trawl 10–14 faths. May 19.

105. **Ophioscion scierus** (Jordan & Gilbert).

849 (1) ——.

106. **Micropogon ectenes** Jordan & Gilbert.

1261 (7) San Filepe Bay. May 19. Seine.
1262 (1) Between San Filepe Point and Shoal Point, Rio Colorado. May 19. Trawl 10 to 14 faths.
777 (1) San Francisquito, Gonzago Bay, San Filepe.
781 (10) ——.
939 (1) San Felipe Bay. May 19. Seine.
1263 (2) ——.
1170 (2) Between San Filepe Point and Shoal Point, Rio Colorado. May 19. Trawl 10 to 14 faths.

107. **Umbrina roncador** Jordan & Gilbert.

898 (1) Off Rocky Bluff, Mexico. May 22. Trawl.

108. **Umbrina xanti** Gill.

1264 (2) San Filepe Bay. May 19. Seine.

109. **Menticirrhus nasus** (Günther).

1265 (1) San Filepe Bay. May 19. Seine.
846 (1) ——.

110. **Polyclemus dumerili** (Bocourt).

A single specimen of 302 mm. in standard length (Figure 12) has an eye of only 6.3 and 25 soft dorsal rays but otherwise the agreement is good.

844 (1) ——.

111. **Cynoscion squamipinnis** (Günther).

905 (3) ——.
992 (2) Between San Filepe and Shoal Point, Rio Colorado. May 19.

112. **Cynoscion othonopterus** Jordan & Gilbert.

1209 (44) Between San Filepe and Shoal Point, Rio Colorado. Trawl 10–14 faths. May 19.

113. **Eriscion reticulatus** (Günther).

904 (1) ——.
993 (1) Between San Filepe and Shoal Point, Rio Colorado. May 19.

114. **Eriscion stolzmanni** (Steindachner).

627 (1) San Filepe Bay. May 19. Seine.
783 (1) San Francisquito, Gonzago Bay, San Filepe.

115. **Eriscion macdonaldi** (Gilbert).

581 (1) Mounted.

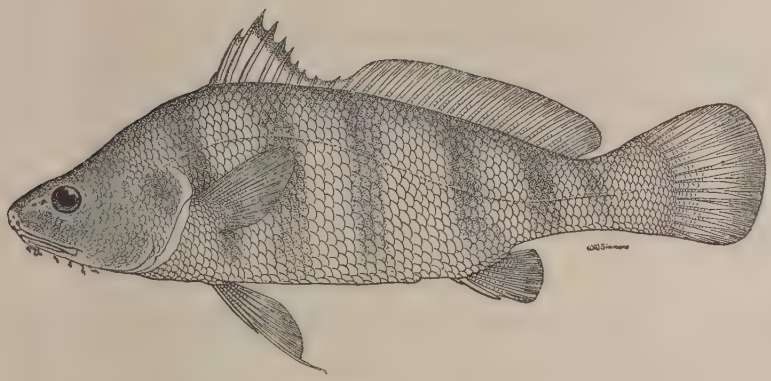

Fig. 12. *Polyclemus dumerili* (Bocourt). 302 mm. standard length.

116. **Atractoscion nobilis** (Ayres).

994 (5) Between San Filepe and Shoal Point, Rio Colorado. May 19.

Family **MALACANTHIDÆ.**

117. **Caulolatilus princips** (Jenyns).

800 (1) San Francisquito Bay. May 7. No. 7.
838 (1) ——.
821 (3) ——.

Family **CIRRHITIDÆ.**

118. **Cirrhites rivulatus** Valenciennes.

835 (1) ——.

Family **EPHIPPIDÆ.**

119. **Chætodipterus zonatus** (Girard).

1052 (2) San Filepe Bay. May. Seine.
850 (1) ——.

Family **CHÆTODONTIDÆ.**

120. **Chætodon nigrirostris** (Gill).

793 (2) 247.
841 (1) ——.
880 (1) ——.

121. **Pomacanthodes zonipectus** Gill.

842 (1) ——
1266 (1) Angelus Bay. May 13. Otter trawl. 13 to 23 faths.

122. **Centropyge passer** (Valenciennes).

864 (2) Bahia Honda, Panama. April 5–6.
925 (1) Cape San Lucas. April 16. 25 ft.
574 (1) Bahia Honda, Panama. Mounted.

Family **ACANTHURIDÆ.**

123. **Acanthurus crestonis** (Jordan & Starks).

584 (1) St. Elmo, Perlas Islands. Mounted.

124. **Xesurus punctatus** (Gill).

819 (1) ——.
881 (1) ——.
566 (1) Mounted.

Order CATAPHRACTI.

Family **SCORPÆNIDÆ.**

125. **Scorpænodes xyris** (Jordan & Gilbert).

690 (2) Espiritu Santo Island. Dynamite. 12 ft. April 21.
691 (2) Hidden Harbor near Danzante Island. Seine and Dynamite. April 27.
692 (1) Off west coast of Mexico. Lat. 14.40.20 N. Long. 92.40.30 W. 19 faths. April 9.
693 (7) Carmen Island. Ballenas Bay. April 30.

1202 (2) Carmen Island, Lower California. Salinas Bay. Dynamite. April 29.

126. **Scorpæna mystes** Jordan & Starks.

903 (1) ——.
904 (1) Puerto Refugio Angel de la Guarda, Seine. May 16.

127. **Scorpæna sonoræ** Jordan & Evermann.

884 (7) Conception Bay, Lower California. May 3.
885 (21) Conception Bay, Lower California. May 3.
886 (5) Conception Bay, Lower California. May 3. Trawl.
888 (1) Conception Bay, Lower California. May 1. Seine.

128. **Scorpæna russula** Jordan & Bollman.

587 (5) West coast of Mexico. 30 faths. Trawl No. 5. Lat. 14.48.40 N. Long. 92.54.40 W. April 9.
689 (1) West coast of Mexico. 19 faths. Lat. 14.40.20 N. Long. 92.40.30 W. April 9.
1267 (2) San Filepe Bay. Seine. May 19.
1207 (3) Between San Filepe and Shoal Point, Rio Colorado. Trawl. 10–14 faths. May 19.

129. **Scorpæna histrio** Jenyns.

698 (2) Perlas Islands. Lat. 8.29.40 N. Long. 78.52.30 W. 19–24 faths. March 31.

Family **TRIGLIDÆ.**

130. **Gurnardus xenisma** (Jordan & Bollman).

699 (2) Perlas Islands. Lat. 8.29.40 N. Long. 78.52.30 W. 19–24 faths. March 31.

131. **Gurnardus loxias** Jordan.

628 (1) Hidden Harbor. April 29. Seine.
629 (6) Lat. 14.48.40 N. Long. 92.54.40 W. April 9. No. 5 trawl. 30 faths. In large numbers.

132. **Prionotus stephanophrys** Lockington.

A single specimen of 185 mm. in standard length is referred to this species with some hesitancy. It is illustrated in Figure 13. Four smaller examples, 115 to 130 mm. have the head slightly larger, the eyes smaller and the head less plane between the eyes. The pectorals are almost entirely black.

695 (1) Angelus Bay. Otter trawl. 13 to 23 faths. May 13.
696 (4) West coast of Mexico. Lat. 14.48.40 N. Long. 92.54.40 W. 30 faths. No. 5 trawl. April 9.
803 (1) San Francisquito Bay. No. 7. May 7.

Fig. 13. *Prionotus stephanophrys* Lockington. 185 mm. standard length. No. 803.

133. **Prionotus quiescens** Jordan & Bollman.

697 (1) West coast of Mexico. Lat. 14.48.40. N. Long. 92.54.40 W. 30 faths. No. 5 trawl. April 9.

134. **Prionotus horrens** Richardson.

902 (2) ——.

Order CHROMIDES.

Family **POMACENTRIDÆ.**

135. **Furcaria atrilobata** (Gill).

1093 (2) Bahia Honda, Panama. April 6. Seine.
1268 (2) Espiritu Santos Island. April 21.
917 (1) Bahia Honda, Panama. April 6. Seine.

136. **Eupomacentrus rectifrænum** (Gill).

1114 (3) Salina Bay, Carmen Island. April 29. Dynamite.
1269 (3) Espiritu Santos Island. April 21.
1270 (4) Espiritu Santos Island. April 21.
812 (4) St. Elmo Bay, Perlas Islands. April 1. Shore Coll.
940 (1) Off Mexico. Lat. 14.40.20 N. Long. 92.40.30 W. April 9. 19 faths.
949 (2) Carmen Island, Ballenas Bay. April 30.

137. **Abudefduf declivifrons** (Gill).

866 (1) Bahia Honda, Panama. April 5–6.
1094 (3) Bahia Honda, Panama. April 6. Seine.
785 (1) San Francisquito, Gonzago Bay, San Filepe.
811 (5) St. Elmo Bay, Perlas Islands. April 1. Shore Coll.
887 (1) ——.
911 (6) Conception Bay. May 1. Seine.
915 (1) Bahia Honda, Panama. April 6. Seine.

138. **Stegastes dorsalis** (Gill.)

884 (1) ——.

Order PHARYNGOGNATHI.

Family **LABRIDÆ.**

139. **Bodianus diplotænia** (Gill).

1076 (1) San Diego Rocks. April 25. Dynamite. 4 faths.
1079 (2) Espiritu Santos Island. April 21. Dynamite. 3 faths.
883 (1) ——.
1201 (1) Gonzago Bay, Lower California. Seine. May 17.

140. **Pimelometopon pulcher** (Ayres).

843 (1) ——.
572 (1) Cape San Lucas. Mounted.

141. **Pimelometopon darwinii** (Jenyns).

587 (1) Espiritu Santos. Mounted.

142. **Iridio sellifer** (Gilbert).

1110 (1) Hidden Harbor, Lower California. April 29. Seine.
586 (1) San Luis, Gonzago Bay. Mounted.

143. **Iridio semicinctus** (Ayres).

Some females lack the dark axillary spot.
1108 (5) San Francisco Bay, Mexico. May 7. Seine and dynamite.
1031 (5) Puerto Refugio, Angel de la Guarda. May 15. Seine. (Males).
1032 (13) Do. (Females and immature.)
1106 (2) Gonzago Bay. May 17.
1271 (2) Conception Bay, Lower California. May 1. Seine.
784 (3) San Francisquito, Gonzago Bay, San Filepe.
942 (1) Gonzago Bay.

144. **Iridio dispilus** (Günther).

1107 (2) Gonzago Bay. May 17. Seine.

145. **Thalassoma lucasanum** (Gill).

The proportional measurements of this specimen throw it to this species, but the coloration is more nearly like that of *T. duperrey* (Quoy & Gaimard). Possibly they are identical.

1109 (1) San Jose Island. April 24. Seine.

Family **SPARISOMIDÆ.**

146. **Leptoscarus xenodon** Gilbert.

In the present series, the largest of which is 168 mm. s. l., the caudal is slightly rounded instead of being lunate as described. The other essential points are in agreement although the pattern varies greatly from one specimen to another as would naturally be expected in this family. The form of the caudal is thought to be an age character, such changes of form being more or less characteristic of the Pharyngognathi. Two from Tiburon Island (1112) are a pale unmottled greenish and a third (947) is slightly mottled.

1111 (6) San Francisco Bay, Mexico. May 7. Seine.
1112 (2) Tiburon Island. May 25.
1272 (1) Conception Bay, Lower California. May 1. Seine.
795 (2) San Francisquito Bay. May 7. No. 7.
947 (1) Tiburon Island. May 25. Seine.

147. **Sparisoma viride** (Bonnaterre).

626 (1) Mounted.

Family **SCARIDÆ.**

148. **Scarus azureus** Meek & Hildebrand.

Two small specimens may be the young of this little-known species.

1113 (2) San Francisco Bay, Mexico. May 7. Seine.

149. **Scarus noyesi** Heller & Snodgrass.

585 (1) Bahia Honda. Mounted.

Order DISCOCEPHALI

Family **ECHENEIDÆ.**

150. **Remilegia australis** (Bennett).

There is a single specimen of this little-known species of 95 mm. s. l. The Jordan and Evermann description (1896) is exceptionally full and good with the

exception that the tail of the present example is forked instead of truncate. Dorsal XXVII–22; anal 24. Uniform slate gray with the margins of the dorsal and anal white as are the tips of the tail. The tail form above referred to may be an age character.

1273 (1) ——.

151. **Remora remora** (Linnæus).

1048 (1) 247.

1081 (1) April. Stomach of a 15′ *Manta*.

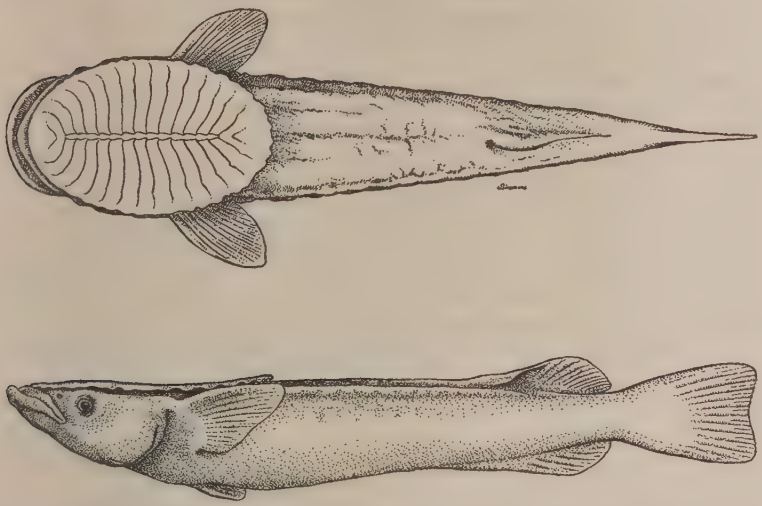

Fig. 14. *Remorina albescens* (Temminck and Schlegel). 225 mm. standard length. No. 1049.

152. **Remorina albescens** (Temminck & Schlegel).

The largest specimen, 225 mm. in standard length, is illustrated in Fig. 14.

1049 (1) 247.

867 (1) Bahia Honda, Panama. April 5–6.

804 (1) San Francisquito Bay. May 7. No. 7.

1087 (1) Hidden Harbor, near Danzante Island. April 27. Seine and dynamite.

1274 (1) Gorda Point, Lower California. April 18.

Order JUGULARES.

Family **OPISTHOGNATHIDÆ.**

153. **Opisthognathus punctatum** Peters.

882 (2) ——.

970 (1) Espiritu Santos Islands. April 21. Dynamite. 6 feet of water.

Family **OPHIDIIDÆ.**

154. **Ophidion nigracauda** new species.

Type No 980 Bingham Oceanographic Collection. Standard length 130 mm.; total length 132 mm. Fig. 15.

Head 4.95; depth 7.5.

Body elongate, compressed; the tail long and tapering; body 2.7; width of head about 1.5 in depth of head; eye large, the orbit 3.6 in head; larger than snout which is 5.1; interorbital 1.4 in snout; maxillary reaches to under posterior margin of eye, 2.25 in head. Head scaleless, body covered with small imbedded linear scales, somewhat as in *Anguilla* which average about ½ pupil in length and are usually arranged in groups of three or more; pectorals moderate, 2.2 in head; ventrals of two filaments each, the largest 1.5 in head, inserted under middle of eye; dorsal inserted about over middle of pectorals; teeth sharp and slightly recurved, in more than one row in each jaw; vomer and palatines with slightly larger but similar teeth; gill-rakers 4; air-bladder simple and oblong-ovate in shape; other characters typical of genus.

Coloration—Uniform pale tan, lighter below; dorsal and anal light with a dark edging anteriorly, on about 2/3 their length; caudal and its base covered with a very dark brown spot, a little less than diameter of eye, which has a short forwardly directed process on dorsal and anal.

This species seems to be closest to *O. beani* Jordan and Gilbert of the Atlantic, in proportions, but is readily separated on the character of the air-bladder which is not pointed, the coloration and minor measurements.

Named in reference to the dark caudal spot.

980 (1) Type Refugio Bay. May 16. Seine.

155. **Ophidion iris** new species.

Type No. 981 Bingham Oceanographic Collection. Standard length 113 mm.; total length 115 mm. Fig. 16.

Head 5.1; depth 7.2.

Body elongate, compressed; the tail long and little tapering; body 2.8; width of head about 1.5 in depth of head; eye large, the orbit 3.8 in head; longer than snout which is 4.9; interorbital 1.5 in snout; maxillary reaches to midway between posterior margin of pupil and eye; 2.2 in head. Head scaleless; body

Fig. 15. *Ophidion nigracauda* new species. Type.

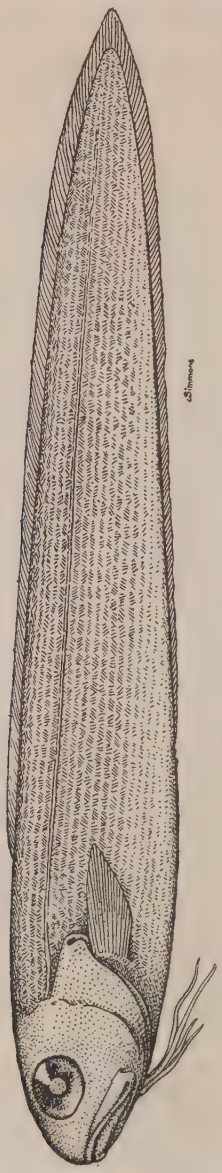

Fig. 16. *Ophidion iris* new species. Type.

covered with small imbedded linear scales, somewhat as in *Anguilla* which average about 2/3 pupil in length and are usually arranged in groups of 4 or more; pectorals moderate 2.2 in head; ventrals of two filaments each, the longest 1.7 in head, inserted under anterior margin of pupil; dorsal inserted a little in advance of tips of pectorals; teeth sharp and slightly recurved, in more than one row in each jaw; vomer and palatines with teeth of the same size; gill-rakers 4; aid-bladder simple and oblong-ovate in outlines; other characters typical of the genus.

Coloration—Uniform pinkish brown, very slightly lighter below; dorsal and anal irregularly edged with dark, especially anteriorly, otherwise plain. Iris unusual. The upper parts black but this color does not reach below an irregular line below the pupil. Under this line the iris is white.

This species differs from Atlantic species as does *O. nigracauda*. These two from the Pacific may be separated as follows.

A. Eye normal (the iris uniformly black); a dark prominent caudal spot; teeth in roof of mouth larger than those in jaws.....*nigracauda.*

AA. Eye pigmented above, which meets an irregular boundary line below the pupil, beyond which it is white; no dark caudal spot; teeth in roof of mouth not larger than those in jaws.....*iris.*

Named for the unusual iris.

981 (1) Type Gonzago Bay.

Family **BATRACHOIDIDÆ.**

156. **Porichthys margaritatus** (Richardson).

When preparing my report on the fish fauna of the Rio Tuyra Basin (Breder 1927b) the Meek and Hildebrand Vol. 3 (1928) was not available to me. Therefore, I take this opportunity to mention the present species as an additional record to that river system. This raises the list of known species from the Rio Tuyra from 57 to 58 and of the Basin from 76 to 77 species. It makes the number of species by which the Tuyra exceeds the Chucunaque 14 instead of 13. As this is such a decidedly marine form it is doubtful if it ever actually gets into the Rio Chucunaque proper at any time.

968 (3) Perlas Islands. March 31. Lat. 9.29.40 N. Long. 78.52.30 W. 19 to 24 faths.

964 (1) Puerto Refugio, Angel de la Guarda. May 15. Seine.

965 (13) Perlas Islands. March 31. Lat. 8.29.40 N. Long. 78.52.30 W. 19 to 24 faths.

969 (1) Lat. 30.28.N. Long. 114.34 W. May 18. Trawl.

966 (1) Angelus Bay. May 13. Otter trawl. 13 to 32 faths.

967 (22) Conception Bay. May 3.

1203 (1) Conception Bay. May 1.

Order XENOPTERYGII.

Family **GOBIESOCIDÆ.**

157. **Bryssetæres pinniger** (Gilbert).

978 (1) Puerto Refugio.
974 (8) Puerto Refugio, Angel de la Guarda. May 15. Seine.
975 (5) Puerto Refugio, Angel de la Guarda. May 15. Seine. Dark olive.
977 (1) Gonzago Bay.

158. **Gobiesox funebris** Gilbert.

976 (1) Puerto Refugio. Angel de la Guarda. May 15.
979 (1) Puerto Refugio.

Order PLECTOGNATHI.

Family **BALISTIDÆ.**

159. **Sufflamen verres** (Gilbert & Starks).

1095 (3) Bahia Honda, Panama. April 6. Seine.
814 (1) St. Elmo Bay, Perlas Islands. April 1. Shore Coll.
893 (1) ——.
869 (1) Perlas Islands. April 2–3.
919 (3) Bahia Honda, Panama. April 6. Seine.
1275 (1) San Jose, Perlas Islands. Mounted.

Family **TETRAODONTIDÆ.**

160. **Spheroides lobatus** (Steindachner).

A single specimen of 50 mm. s. l. compares with *S. angusticeps* as noted under that heading and lacks the paired dorsal flaps.

A large specimen of 223 mm. s. l. (954) is referred to this species. Its differences from the Meek and Hildebrand description are as follows, and are thought to be referable to size. Head 2.7; depth 4.4; snout 1.9; eye 4.0; interorbital 8.4. Spines on back fall short of dorsal by an eye's diameter; spines on snout obsolescent; sides of head, back and sides of body covered with small adherent scales similar to those on *S. maculatus* (Bloch and Schneider) and *S. culepidotus* Metzelaar (See Breder 1927a).

Coloration—Dark gray above, somewhat mottled with darker; a row of 12 dark spots bounding the light ventral surface; caudal fin uniform dusky, no bar at base; other fins pale.

It is quite evident that this fish is not *S. angusticeps* and unless it can be shown

to be still a third species it re-establishes the long questioned distinction of the two forms.

954 (2) ——.
1210 (5) Pedro Gonzales Island, Perlas Island. April 2.

161. **Spheroides angusticeps** (Jenyns).

A single specimen of 82 mm. s. l. should be referred to this species according to Meek & Hildebrand 1923. The present specimen has the narrow interorbital and dermal flaps of *angusticeps* but the snout and coloration agree with *S. lobatus*. But this specimen is not of the species here called *lobatus*.

1276 (1) ——.

162. **Spheroides kendalli** Meek & Hildebrand.

A single large example 263 mm. s. l. is referred to this form. The present specimen, larger than the described material, has the interorbital very slightly concave instead of convex but otherwise the agreement is good.

955 (1) Bahia Honda, Panama. April 5–6.

163. **Cheilichthys annulatus** (Jenyns).

1062 (5) Gonzago Bay. May 14. Seine.
1064 (1) Cape San Lucas, Lower California. April 15.
1068 (7) Conception Bay, Lower California. May 3.
1088 (6) Hidden Harbor, near Danzante Island. April 27. Seine and dynamite.
973 (2) Perlas Islands. March 31. Rey Island. Seine.

164. **Tetraodon hispidus** Linnæus.

1059 (2) Bahia Honda, Panama. April 6.
1080 (1) St. Elmo Bay, Perlas Islands. April 1. Dynamite. 3 faths.

165. **Tetraodon setosus** Smith.

1060 (1) San Jose, Lower California. April 24.
818 (1) ——.
839 (1) ——.

166. **Guentheridia formosa** (Günther).

575 (1) Bahia Honda. Mounted.

Family **CANTHIGASTERIDÆ.**

167a. **Canthigaster punctatissimus** (Günther).

1057 (3) Bahia Honda, Panama. April 6.

167b. **Canthigaster punctatissimus reticulatus** new subspecies.

Type No. 1067 Bingham Oceanographic Collection, Figure 17. Standard length 63 mm.; total length 77 mm.

Head 2.85; depth 2.4; dorsal 9; anal 9; snout 1.5; eye in snout 2.85; interorbital in snout 21.

Anal inserted under last dorsal ray. Interorbital slightly concave, snout slightly concave. Form essentially as *C. p. punctatissimus*.

Coloration—Generally brownish, sides, chiefly behind pectorals covered with spots not larger than pupil in such profusion that the appearance is given of a dark reticulation on a light ground especially toward the ventral surface. As they become larger and closer together, ventrad, they become less regular in

Fig. 17. *Canthigaster punctatissimus reticulatus* **new subspecies. Type.**

outline and tend to be longish ovals but are not infrequently angulated. At the level of the pectoral dark central dots center most of these light spots. These latter become more intense and larger as the light spots decrease in size toward the back so that just below a level with the top of the eye they appear as dark ocellated spots and higher still simply as dark dots. The face is covered with similar small dark dots. The chin is immaculate and extending back from it to edlow pectoral tips are wide spaced dusky dots. The dorsal base is dark.

There are 10 paratypes ranging down to 25 mm. s. l. They are all very similar in general appearance but vary considerably in detail, the reticulation being larger in the small examples and the dark spots being few or absent.

This subspecies may be readily separated from *C. p. punctatissimus*, Figure 18, by the presence of dark dots on the dorsal surface, dark centers on the light lateral spots, no light dots on the face, the general large size and much more pronounced reticulated effect of the ventral light spots and the dark, almost black dorsal base.

It is possible, of course, that this form should be recognized as a distinct non-intergrading species, for we have no intermediates but prefer, for the present at least, to consider it a Lower California variation of the Panama species.

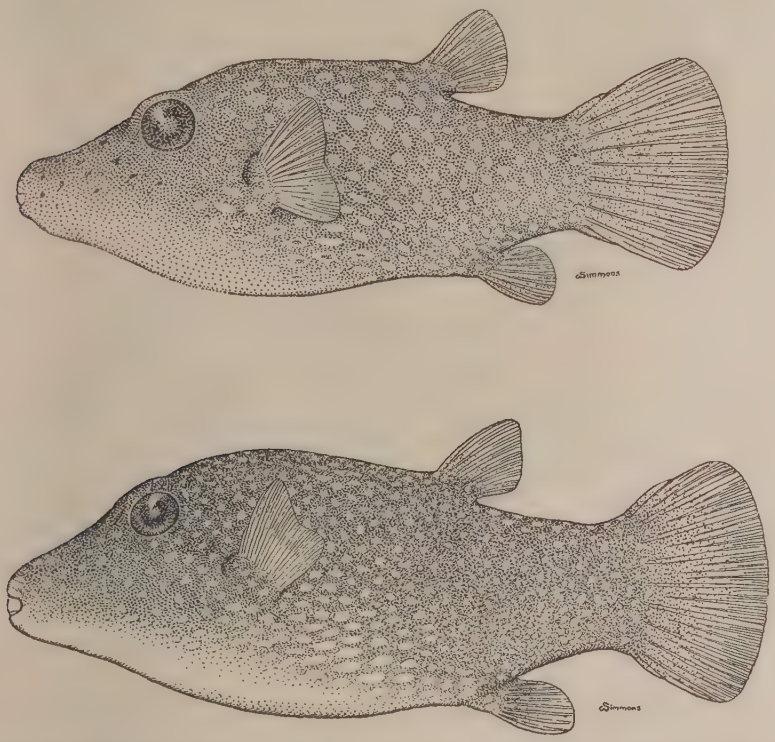

Fig. 18. *Canthigaster punctatissimus.* Upper: *C. p. reticulatus.* 44 mm. standard length. No. 1059. Lower: *C. p. punctatissimus.* 43 mm. standard length. No. 1057.

The present material may be separated according to the following key and makes possible an extension of the key of Breder 1927a, separating the Atlantic and Pacific species, which are very different in appearance.

KEY TO NORTH AMERICAN CANTHIGASTER.

A. Caudal fin slightly convex; dorsal origin slightly nearer tip of tail than nostril; sides profusely spotted; caudal not edged with dark.

B. All spots light, none with dark centers; dorsal base not darker than ground color of back; caudal without dark dots. . . . . *C. p. punctatissimus* (Günther).

BB. All spots not light, those on head dark; nearly all on sides centered with dark; dorsal base slightly darker than ground color of back; caudal with a few dusky dots proximally.....*C. p. reticulatus* new subspecies.

AA. Caudal fin slightly concave; dorsal origin slightly nearer nostril than tip of lower middle caudal rays; sides not spotted; dark radiating lines from lower half of eye; dark anastomosing lines on ventral half of peduncle; caudal edged above and below with dark.....*C. rostratus* (Bloch).

Named *reticulatus* in reference to the pattern.

1067 (1) Type San Jose Island, Lower California. April 15.
1277 (2) do.
1063 (5) Cape San Lucas, Lower California. April 15.
1089 (1) Hidden Harbor, near Danzante Island. April 27. Seine and dynamite.
1278 (2) Espiritu, Santos Island. April 21.

Family **DIODONTIDÆ.**

168. **Diodon holocanthus** Linnæus.

1065 (1) Cape San Lucas, Lower California. April 15.
1083 (1) Bahia Honda, Panama, April 6. Seine.
813 (3) St. Elmo Bay, Perlas Islands. April 1. Shore Coll.
840 (4) ——.
865 (2) Bahia Honda, Panama. April 5–6.

Order PEDICULATI.

Family **LOPHIIDÆ.**

169. **Lophiomus setigerus** (Vahl).

963 (2) Perlas Islands. March 3. Lat. 8.29.40 N. Long. 78.52.30 W. 19 to 24 faths.
971 (1) April 10. Trawl. 10 faths.

Family **ANTENNARIDÆ.**

170. **Antennarius sanguineus** Gill.

960 (1) Gonzago Bay. May 18. Trawl.
961 (1) San Francisquito Bay. May 10. In weed along shore.
962 (1) San Francisquito. May 11. In weed along shore.

171. **Antennarius avalonis** Jordan & Starks.

1204 (1) Conception Bay. Seine. May 1.

Family **OGCOCEPHALIDÆ.**

172. **Zalieutes elater** (Jordan & Gilbert).

An example of 36.5 mm. in standard length is illustrated by Figure 19. At this size the proportions suggest *Ogcocephalus*. The color on the back is a uniform dark brown except for a faint lighter media streak between occiput and dorsal flanked on either side by a darker line.

956 (1) Hidden Harbor. April 29. Seine.
957 (2) May 18. Trawl. 17 faths.

Fig. 19. *Zalieutes elater.* (Jordan and Gilbert) 36.5 mm. standard length. No. 958.

958 (1) Perlas Islands. March 31. Lat. 8.29.40 N. Long. 78.52.30 W. 19 to 24 faths.
959 (1) do.

ADDENDA.

The following material not included in the preceding report, Vol. 2, No. 2 of this series.

Opisthonema libertate (Günther).

1212 (5) Pedro Gonzales Island, Perlas Islands. April 2.

Anchovia naso (Gilbert & Pierson).

1213 (2) Pedro Gonzales Island, Perlas Islands. April 2.

Cololabis brevirostris (Peters).

1214 (2) San Jose del Cabo, Lower California. Surface at night. April 14.

ATLANTIC MATERIAL

The following specimens were collected in the Atlantic incidental to the main work of the trip.

Family Clupeidæ.

Sardinia anchovia (Cuvier & Valenciennes).

1279 (1) Palm Beach. March 24. Taken with a gig.

Family Carangidæ.

Decapterus punctatus (Agassiz).

601 (3) Palm Beach. March 24. This and *Sardinella* by the thousands about the "Pawnee."

Family Nomeidæ.

Nomeus gronovii (Gmelin).

602 (6) Key West Harbor. Feb. 26.

Family Serranidæ.

Mycteroperca sp.

606 (1) Key West. March 10. 30 faths.

Hypoplectrus unicolor puella (Cuvier & Valenciennes).

This example lacks all the bars on the body except the peduncular saddle-like mark. Otherwise it is similar to those of the 1925 collection.

605 (1) Key West. March 10. 30 faths.

Family Lutianidæ.

Lutianus apodus (Walbaum).

617 (1) —.
624 (1) —.

Rhomboplites aurorubens (Cuvier & Valenciennes).

618 (1) —.

Family Pomacentridæ.

Stegastes chrysurus (Cuvier & Valenciennes).

616 (1) —.

Family Balistidæ.

Cantherines amphioxys (Cope).

This specimen of 43 mm. s. l. has five irregular rows of dark dots (about ½ pupil) along the sides from the pectoral to the caudal base on a drab background. The pelvic flap is light. The membrane of the dorsal spine is dusky. The caudal is dusky mesially and is narrowly margined with white. The mesial dusky portion lightens anteriorly, becoming pale at the caudal base. A specimen from Royal Island Harbor, March 15, 1925, of 62 mm. is colored as follows (Breder 1927a), "The body coloration is uniform drab. The pelvic flap and the membrane of the single spine is dusky. The caudal is barred obscurely with darker."

622 (1) 6 miles east of Cat Island, Bahamas. March 25. Lat. 24.36 N. Long. 75 24 W. In sargasso weed.

Family Gobiidæ.

Ioglossus calliurus Bean.

621 (2) Key West. March 10. 30 faths.

Family Blenniidæ.

Blenniidæ sp.

620 (1) Key West Harbor. Feb. 26. Surface.

Family Echeneidæ.

Echeneis naucrates Linnæus.

603 (1) Key West. March 16. On *Seriola lalandi.*
604 (1) Key West. Feb. 26. On *Rachycentron canadus* 53" long.

Family Antennaridæ.

Histrio pictus (Cuvier & Valenciennes).

623 (29) Coast of Cat Island. March 25. Taken in sargasso weed.

Family Ogcocephalidæ.

Ogcocephalus radiatus (Mitchill).

625 (1) Key West. Mounted.

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